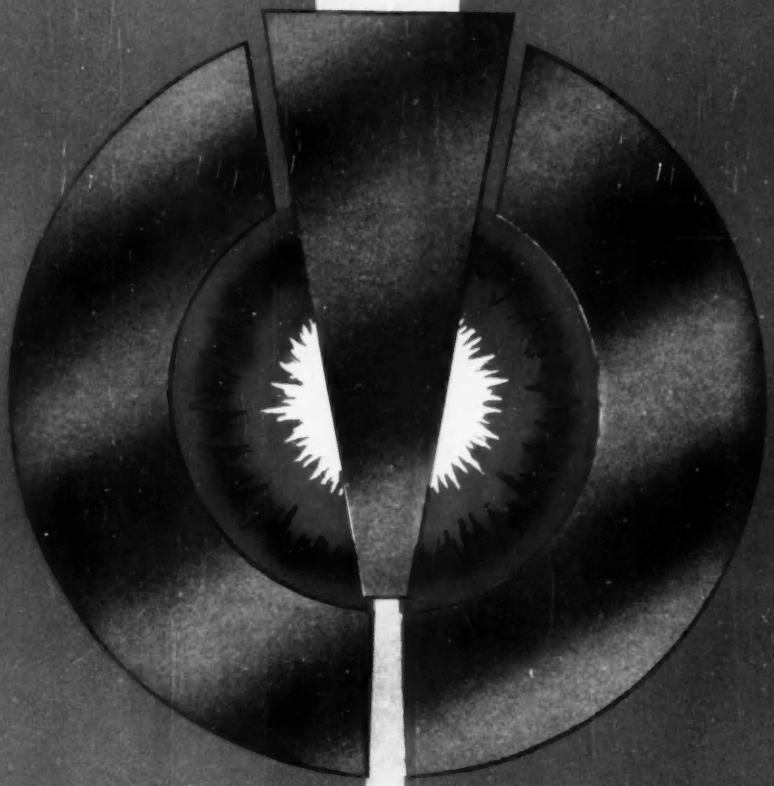
AUTOMOTIVE INDUSTRIES

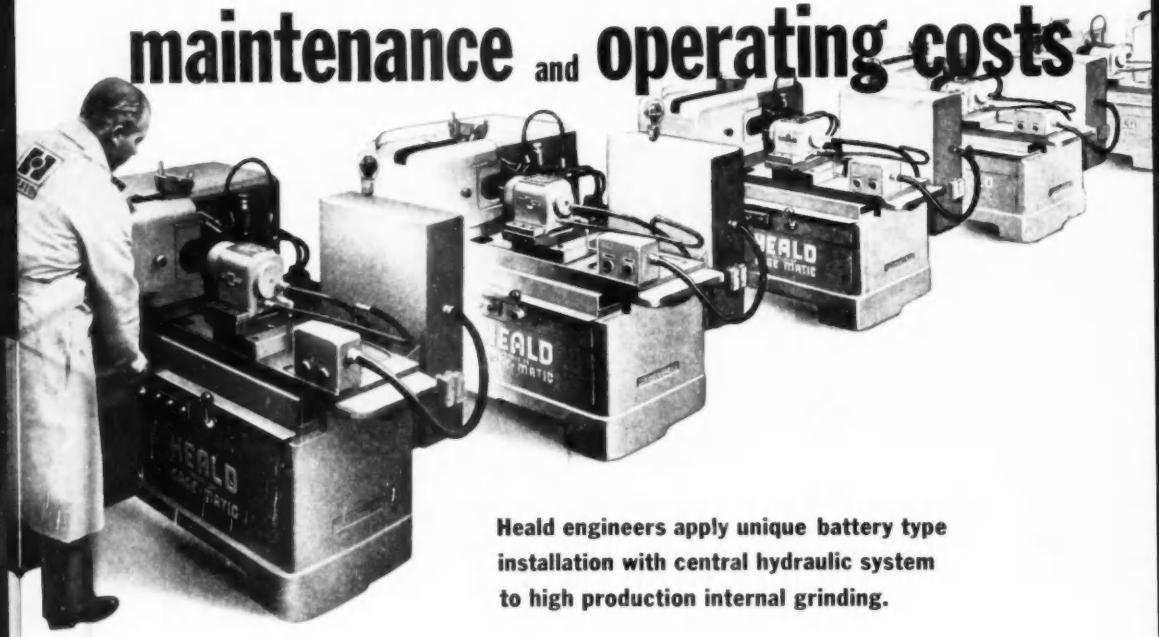
NOVEMBER 15, 1949



IN THIS ISSUE

A CHILTON PUBLICATION

How Heald engineering saves on initial investment, maintenance and operating costs

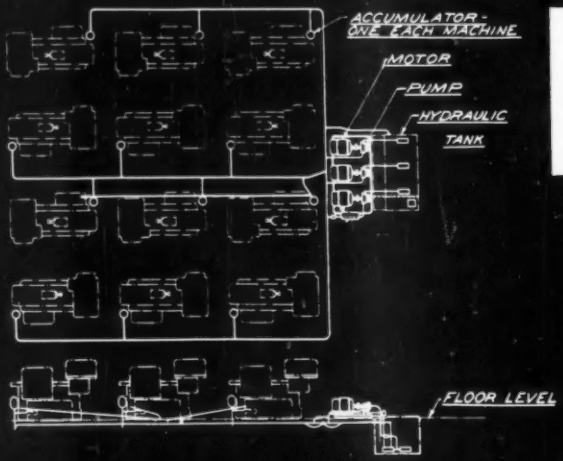


Heald engineers apply unique battery type installation with central hydraulic system to high production internal grinding.

Production men everywhere know what a Heald Internal Grinder can do to boost production, improve product quality, and reduce overall cost per part. And, as the solution to a specific high-production grinding problem, Heald engineering has now developed a method of operating several of these high-speed, fully-automatic machines from a single hydraulic power source, central coolant supply, and central hi-frequency electric power source where applicable.

Where large volume production is required, Heald-engineered battery type installations have proved extremely profitable. Because these Internal Grinders are completely automatic, several machines can easily be tended by a single operator. And because all machines operate from a single hydraulic power unit, these battery type installations offer important savings in initial investment, maintenance, and operating costs.

Regardless of your quantity requirements, you can depend on Heald engineering to help you increase production and reduce the cost of precision finished parts. Your nearest Heald representative is qualified to give you expert assistance on any grinding or borizing problems.



Diagrammatic sketch shows one suggested plan for battery type installation with central hydraulic system. Whether your internal grinding requirements adapt themselves to a single unit or battery type installations, Heald field engineers will be glad to study your needs and make helpful recommendations.

HEALD

PRECISION INTERNAL AND SURFACE GRINDERS

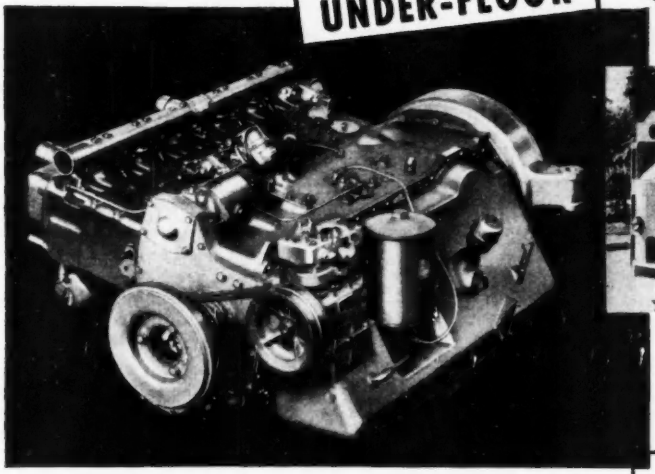
PRECISION BORE-MATIC FINISHING MACHINES

THE HEALD MACHINE COMPANY
Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton • Detroit
Indianapolis • Lansing • New York

new WAUKESHA *Horizontal* ENGINE

UNDER-FLOOR



For city, interurban and cross-country motor coaches, school buses, high speed COE truck-tractors and high speed haulage equipment.

MODEL 140-GKB

Overall Length	50
Overall Width	49
Overall Depth	24
Maximum Drop From Support	11½
Bore and Stroke	4½ x 5½
Number of Cylinders	6
Displacement, Cu. In.	525
Number of Main Brgs.	7
Front Main Brg., Dia. x Lgth.	3¼ x 1⅜
Center Main Brg., Dia. x Lgth.	3¼ x 2 5/16
Inter. Brgs. (4), Dia. x Lgth.	3¼ x 1⅜
Rear Main Brg., Dia. x Lgth.	3¼ x 3
Conn. Rod Brg., Dia. x Lgth.	2⅝ x 1¾
Conn. Rod Lgth., C. to C.	10¼
Piston Pin, Floating, Dia. x Lgth.	1⅜ x 3⅞
Top Ring, Chrome Plated, (1) Width	⅛
Second Ring, Plain, (1) Width	⅛
Oil Control Rings, (2) Width	3/16
Flywheel Housing, S.A.E. No.	3

(All dimensions in inches unless otherwise specified)

CHECK THESE MODERN FEATURES

Crankcase—Combined crankcase and cylinder block lies in horizontal position with cylinders at 10° angle above horizontal supporting arms. Alloy iron casting is exceptionally rigid to insure constant alignment of all moving parts. Extra heavy upper and lower decks provide firm support seats for cylinder sleeves, and extended oil pan flange gives additional strength to resist distortion. The seven-bearing bridges, tied to the side-walls by generous, large radius fillets, together with the directional coolant baffles, add still further to the rigidity of the entire engine structure.

Cylinders—Renewable, wet-type cylinder sleeves of Molychrome alloy, heat-treated to provide suitable hardness and insure long life.

Pistons—Heavy-duty aluminum alloy with four straight-side rings, all above the piston pin. Piston pin is full floating, with rectangular section Tru-Arc retainers.

Connecting Rods—Drop-forged, rifle-drilled, heat-treated, and matched in sets to ¼-ounce tolerance. Caps deeply ribbed and held by two husky alloy heat-treated cap bolts and locks. Large end precision ground for steel-backed, copper-lead precision bearing. Small end has hard bronze, diamond bored bushing.

Crankshaft—Drop-forged, heat-treated alloy steel. Fully counter-balanced and mounted in seven 3¼-inch steel-backed, copper-lead high-duty precision bearings. All main journals and crankpins are hardened to test 600 Brinell. The front end has a highly efficient vibration dampner, which in combination with counter-weights insures smoothness of operation at all loads and speeds.

Valves—Exhaust valves are Stellite-faced chrome-nickel forgings seating in Stellite inserts; intake valves are chrome-nickel alloy. Dual valve springs with taper block keepers and forged spring retainers are employed. Valve guides are renewable. Valve adjustment by screw and lock-nut.

Cooling—A positive gear driven, ball bearing, packless, coolant pump with full length cylinder jackets, baffles, and porting to cylinder head, forces coolant in directed paths at high velocity to every heat-sensitive area. Scaling and sludging are reduced to a minimum.

Lubrication—The positive gear driven oil pump forces oil under pressure to every main, rod, piston pin, camshaft, idler gear stud, and oil pump drive shaft bearing. An intermittent metered pressure line leads oil to the rocker arms and valve chamber as well as to the timing gear spray and air brake compressor. A large capacity oil sump with compartmentation insures a constant oil supply at all times. Both bayonet and indicating dial gauges are provided, as well as convenient inspection and drain openings. A large waste-packed filter is mounted on the oil pan.

Governor—Waukesha-built, gear driven, enclosed and flood oiled over-speed governor; does not prevent manual speed control up to pre-determined top speed.

• There are lots of other details you'll want to learn. Write for full particulars or engineering consultation. No obligation.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS. • *New York, Tulsa, Los Angeles*

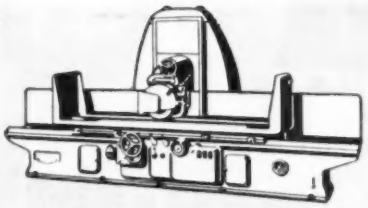
MATTISON GRINDERS

If its a Flat Surface to Grind
There's a Mattison to Grind it.

● With the addition of the production grinding machinery formerly made by the Hanchett Manufacturing Company, Mattison now is in a position to work with you on all your surface, face and disc grinding problems. These machines are made in various types to handle a wide range of work. Experienced fixture engineers are available to give you best production efficiency with Mattison Machines.

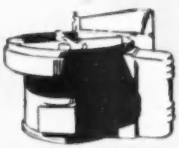
For any flat grinding, ask for our recommendations on the proper method and machine for your job. No obligation, of course.

For catalog on all machines, ask for free copy of general bulletin.

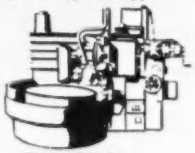


Precision Surface Grinders
Horizontal Spindle

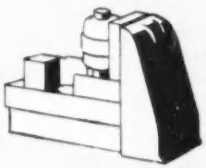
Disc Grinders,
Double Spindle Type



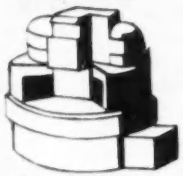
Vertical Spindle
Disc Grinders



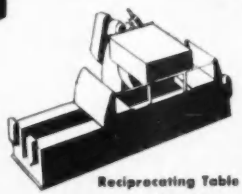
Plano Grinders,
Rotary Table Type



Rotary Table
Surface Grinders

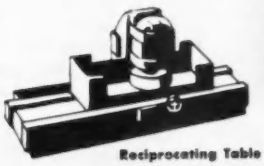


Automatic Rotary
Surface Grinders



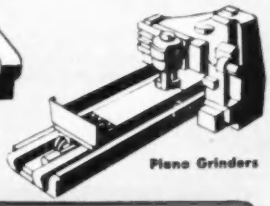
Reciprocating Table
Face Grinders

Disc Grinders,
Single Spindle Type

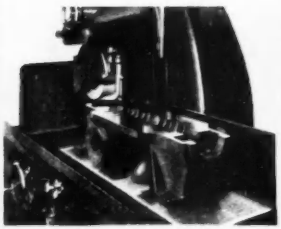


Reciprocating Table
Surface Grinders
Vertical Spindle

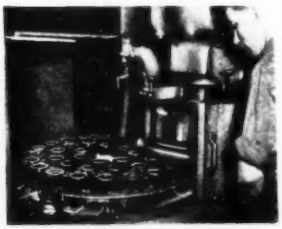
Face Grinders,
Traveling Wheel



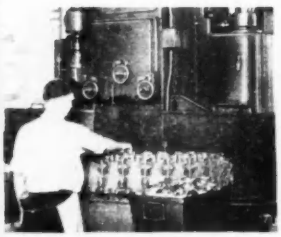
Plano Grinders



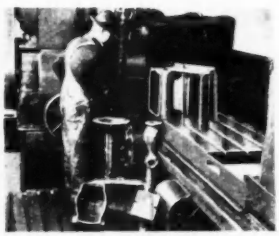
40 hours before — now 4 hours. Pump case ground on Mattison Horizontal Spindle Precision Surface Grinder



320 surfaces of cast iron compression heads per hour, removing 1.32" stock with Mattison No. 24 Rotary Surface Grinder



900 connecting rods per hour, using 40 station fixture to finish grind crank and wrist pin end of assembled rod with Mattison No. 72 Grinder



Shows variety of work run on Mattison Face Grinders

MATTISON MACHINE WORKS
ROCKFORD • ILLINOIS

AUTOMOTIVE INDUSTRIES

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Contents

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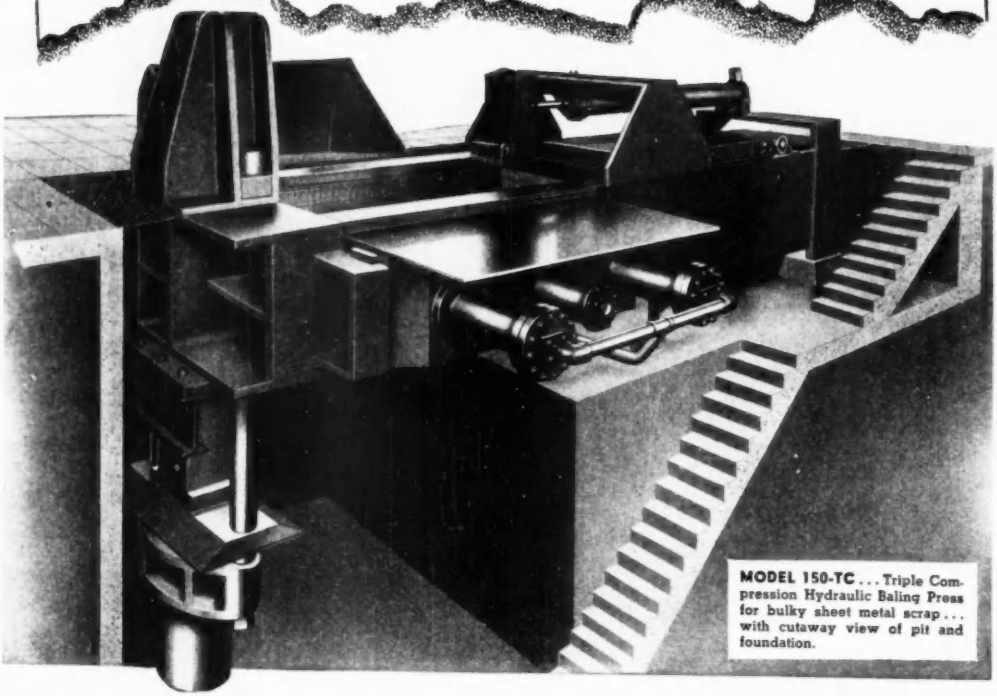
by BALING your Sheet Metal Scrap

A well organized metal working plant which generates a volume of sheet metal stampings or clippings should include equipment for processing such scrap into compact bales of correct size and density for remelting. As such, it becomes valuable "raw material" in the production of new metal — sheets, strip, bars and ingots — and contributes to the conservation of natural resources.

A powerful hydraulic baling press . . . carefully engineered and ruggedly constructed . . . is essential to the orderly low-cost baling of your sheet metal scrap. Galland-Henning builds such balers in a range of sizes and capacities for every industrial need, and offers you competent, experienced counsel toward establishing an efficient, profitable baling operation in your plant. Write —

GALLAND-HENNING MFG. CO.
2747 SOUTH 31ST STREET • MILWAUKEE 15, WISCONSIN

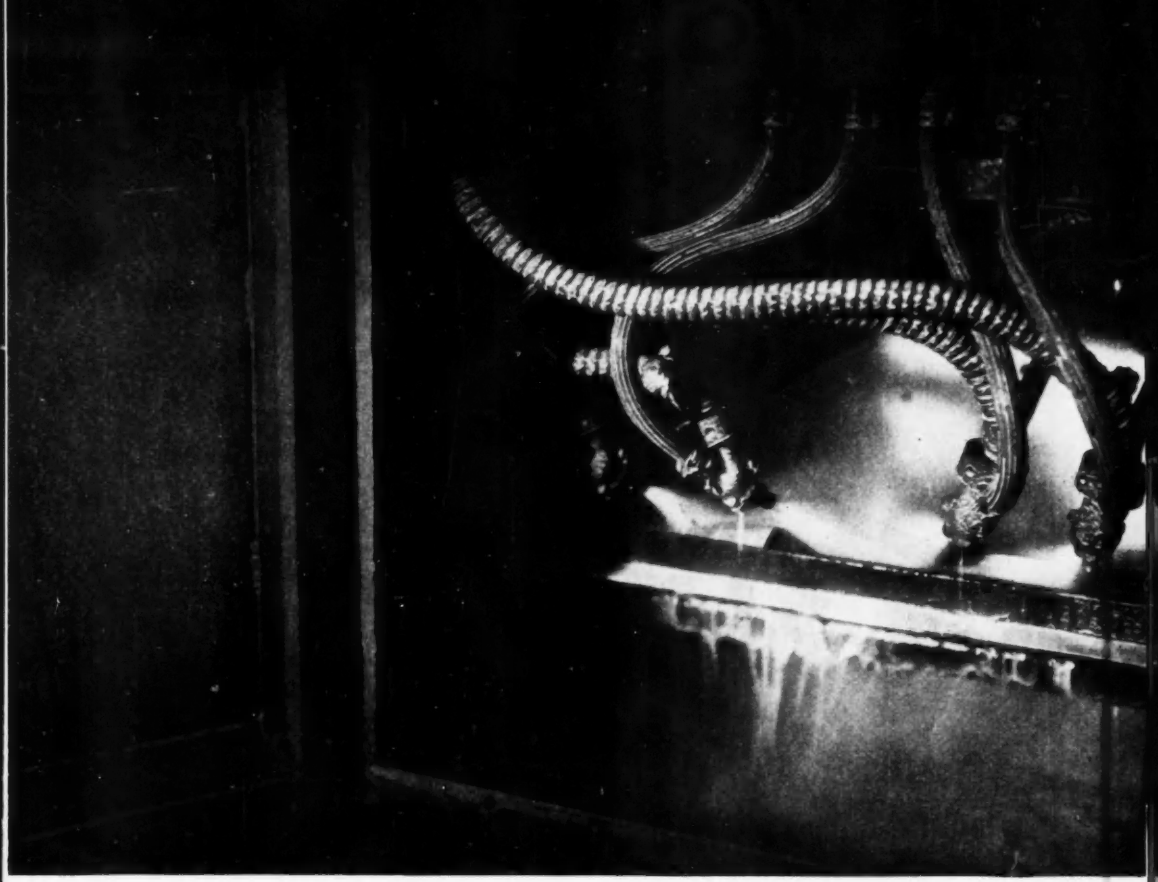


MODEL 150-TC . . . Triple Compression Hydraulic Baling Press for bulky sheet metal scrap . . . with cutaway view of pit and foundation.

GALLAND-HENNING
SCRAP METAL BALING PRESSES

A 5660-1P

ONE OF THE RESOURCES BEHIND A UNIQUE POLICY



THREE TIMES FASTER THAN THE SPEED OF SOUND!

Inside this vapor blast machine at Muskegon Piston Ring Company fine abrasives bombard arbors of piston rings at a speed of 3200 ft. tip velocity per second.

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This modern vapor blast equipment is but one of the rich resources, in both plant and personnel, that stand behind Muskegon's *unique policy*.

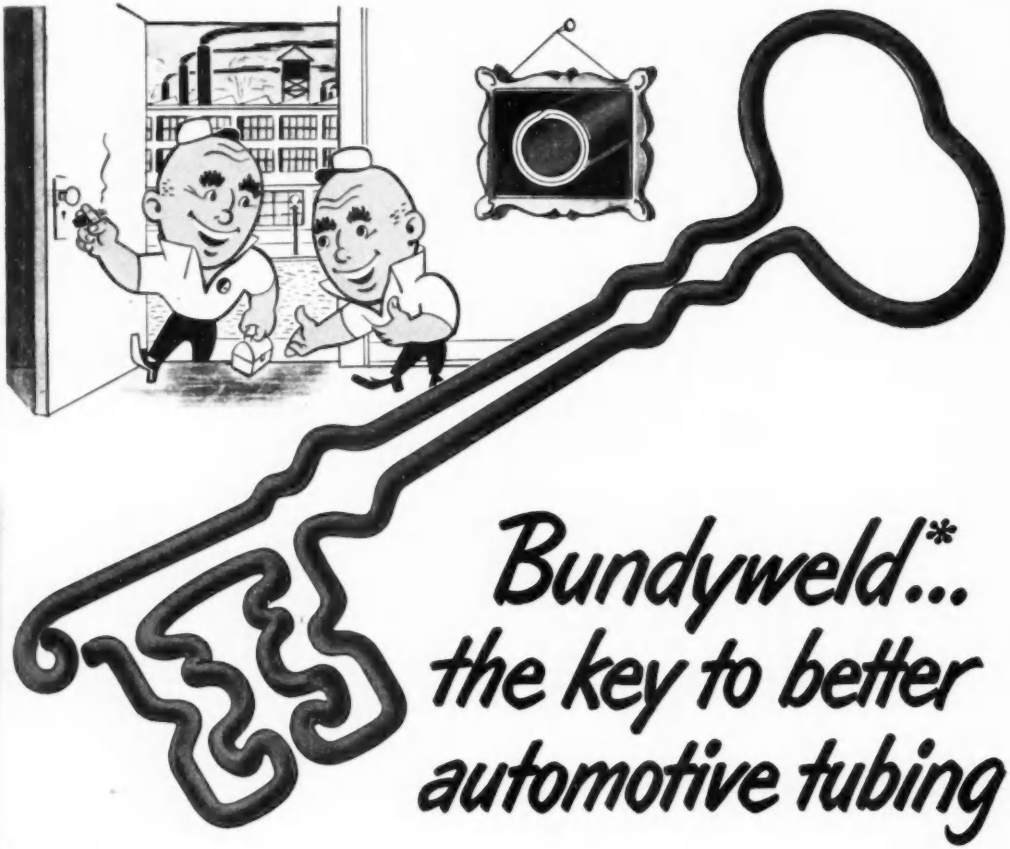
Policy

"It is Muskegon's firmly established policy to sell exclusively to manufacturers (1) for installation as original equipment and (2) for resale for service purposes."

MUSKEGON Piston Rings

MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE BUILDERS' SOURCE"



Bundyweld*... the key to better automotive tubing

Automotive manufacturers have long known Bundyweld* to be the key to better automotive tubing. And with good cause, too.

For Bundyweld is extra-strong and sturdy ... made-to-order to take shock, pressure and vibration in hydraulic brake lines, pressure lines and fuel lines. It's double-walled from a single strip, copper-brazed at all points of wall contact, always held to close manufacturing tolerances . . . rugged, lightweight, and leakproof.

More, Bundyweld Steel Tubing can be readily bent without fear of its collapsing or weakening structurally. It is easily fabricated, a plus for *you* in faster production time or lower production costs.

You'll find that 95% of today's cars employ Bundyweld in as many as twenty different parts. Why not check on this low-cost, outstanding tubing for *your* tubing needs? Contact your near-by Bundy distributor listed below, or write direct to: *Bundy Tubing Company, Detroit 14, Michigan.*

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ENGINEERED TO YOUR EXPECTATIONS

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1 Bundyweld Tubing, made by a patented process, is entirely different from any other tubing. It starts as a single strip of basic metal, coated with a bonding metal.

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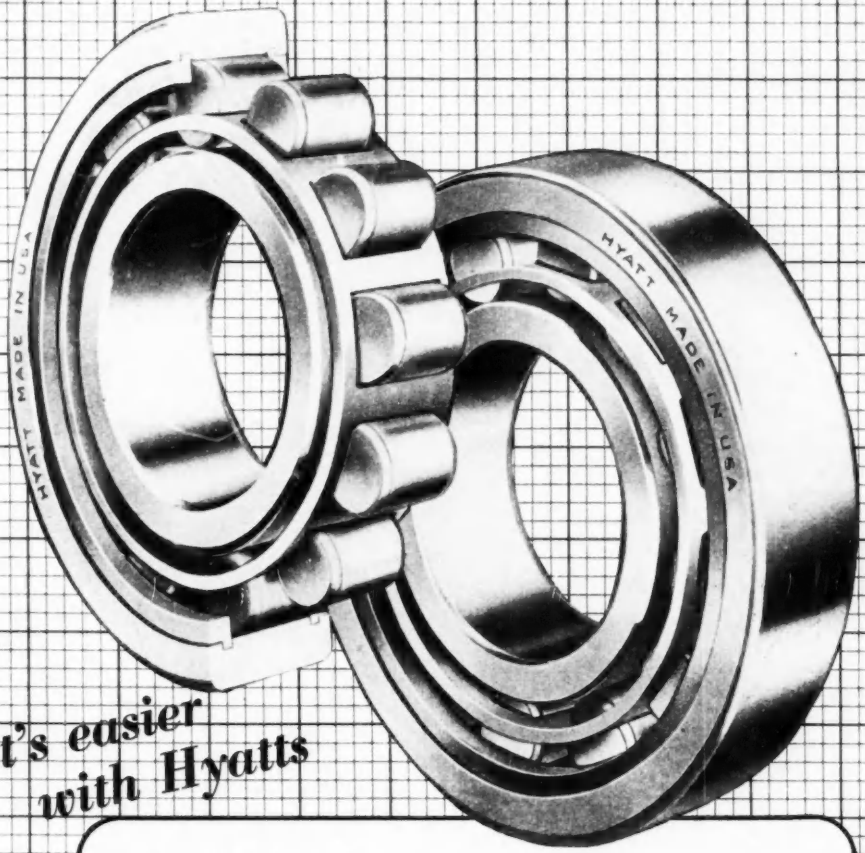

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Yes! Easier every time

Why? Because the straight radial construction and complete interchangeability of bearing parts in Hyatt Hy-Load Bearings make it easier for you.

How? Well, for example, you can mount separable bearing parts on one sub-assembly and install the balance of the bearing in another, then, bring the sub-assemblies together completely confident that all bearing parts will fit perfectly.

And there will be no adjustments, no matching, and no blind fitting. There will be nothing to slow down or complicate your final assembly operation.

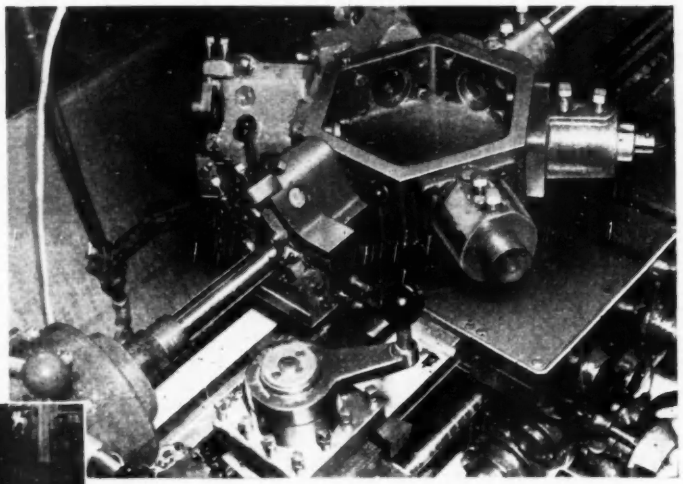
Another good reason for the millions of cars, trucks and buses on the roads and coming off the lines equipped with Hyatt Quiet Roller Bearings in important positions. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey and Detroit, Michigan.

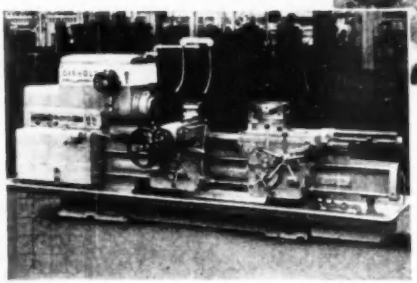
HYATT ROLLER BEARINGS

take shaft jobs Like This:

they take less time on GISHOLT TURRET LATHES

Yes, even in lots as small as 5 or 10 parts, you can't beat turret lathes on this kind of work. Parts are machined complete in 2 operations—total time is less than 4 min.





no extra equipment needed!

With no more than your standard bar equipment, you're all set to cut machining costs on shafts like these. No previous operations . . . such as cutting to length or centering . . . are necessary. And with *two or more tools* from turret and side carriage, you have the basic advantage of turret lathe economy—the time saving that means lower costs.

Before you turn to extra equipment or special attachments, look into the possibilities of doing the job the quick and easy way on Gisholt Turret Lathes. Gisholt engineers will gladly help you.

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY
MADISON 10, WISCONSIN

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

Steering AT ITS BEST

A.C.F. NEW "CONTINENTAL COACH"

ROSS BRINGS EASE . . . AND ECONOMY

THE NEW "Continental Coach" is a deck-and-a-half highway passenger liner, designed as an observation coach, incorporating added conveniences for travel, such as lavatory, buffet service and radio . . . Ross steering is also an outstanding feature of the new "Continental."

The Ross policy of incorporating advancements in design as they are proved by exhaustive tests has resulted in many recent improvements. Current Ross models have:

(1) ***Increased mechanical reduction*** . . . (2) ***More compactness*** . . . (3) ***Reduction in weight*** . . . (4) ***Greater arm angular-travel*** . . . (5) ***Improved metallurgy*** . . . (6) ***Increased efficiency.***

Throughout 42 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

Ross

Cam & Lever ***STEERING***

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

Acadia

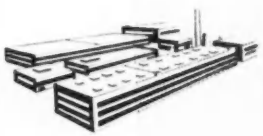
SYNTHETIC RUBBER

There is no great chemical secret nowadays about synthetic rubber. Its ingredients are generally known throughout industry. But there *is* a great difference in the methods, equipment, personnel and inspection in its manufacture. Acadia Synthetic rubber, wherever employed, is widely recognized as "tops."

Your Insurance Against Complaints

Practically all products in the durable goods fields are made up of many parts. Some have a very modest function and rarely are considered by the buyer. But when one of these components (synthetic rubber for example) is poorly made and service is required, the high reputation of your product suffers. So insist on the best—insist on Acadia Synthetic Rubber. Here are a few reasons: It is processed by the very latest mechanical equipment—is held to closest possible tolerances for non-metal cut and molded parts—unusual attention given to maintain uniformity of quality—maximum elasticity, resilience, plasticity—greater resistance to oil, heat, light, wear, age, etc.

Acadia Synthetic Rubber is available in sheets, tubing, strips, channel, extrusions, molded and cut parts, washers, seals, etc. Specify the particular characteristics desired. Acadia engineers are prompt in helping you determine the compound and qualities to best meet your requirements.



Fiftieth Anniversary Year

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ACADIA *Synthetic* PRODUCTS

Processors of Synthetic Rubber and Plastics • Sheets Extrusions • Molded Parts

DIVISION WESTERN FELT WORKS

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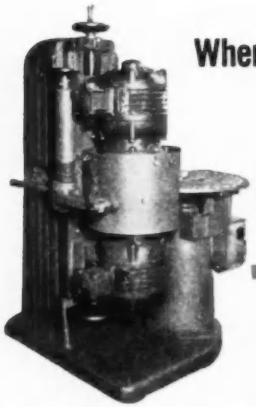


No. 902 Besly Vertical Spindle Grinder for small coil springs, carbon brushes, ceramic parts, etc. Handles up to 4000 pieces per hour — $\frac{1}{8}$" to 1" O.D. and from $\frac{1}{4}$" to 4" long.

When It's a Matter of Grinding Springs and Small Parts...

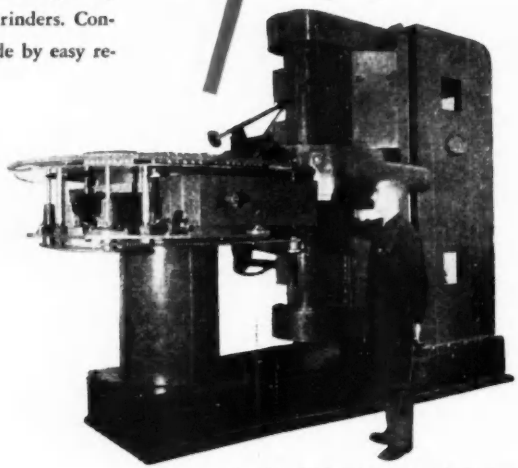
Only BESLY

Offers This *Complete* Line of Production Grinders

14 BASIC MODELS *Proved in Use*

Whatever the job specifications may be, there's sure to be a Besly Grinder that will do the work faster on closer tolerances —*with greater economy*. Sizes range from those that handle the smallest parts to large capacity units for grinding railroad car springs and similar large pieces. Fourteen different types are available to select from. Besly engineering adapts basic models to specific requirements of the user. Versatility in doing many grinding jobs well is characteristic of Besly Grinders. Conversion from one job to another is quickly made by easy replacement of the work holder.

Simplify production! Cut job costs! Talk over your requirements with a Besly engineer. Besly Grinders earn their way with savings of time, labor and material.



No. 926—53" Besly Double Spindle Vertical Grinder with power driven rotary fixture and multiple station feed wheel. Tooled for coil springs $\frac{3}{4}$" to 6" long—800 to 1500 per hour.

TITAN WHEELS

Write today for this helpful booklet which offers useful facts on abrasive wheels . . . It's free. Contains much valuable data on grinding wheels and abrasives. Learn how Besly-Titan Steelbacs cut "down time" and boost output.

Maybe GRINDING is the Better Way . . . Better Check with

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BESLY

CHARLES H. BESLY & COMPANY • 118-124 North Clinton Street, Chicago 6, Illinois
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Four typical machine shops report

"LONGER TOOL LIFE"
"BETTER FINISH"
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} *WITH NEW*

J&L *FREE-CUTTING* "E"* *STEEL*

J&L STEEL

Four typical examples, taken from 100 case histories, show superior machinability of J&L "E" Steel.

For 4 years before "E" Steel was publicly announced, this new, free-cutting bessemer screw stock was tried by independent machine shops throughout the metal-working industry.

More than 6,100 tons were tested in over 100 applications!

Here are quotations from 4 typical case histories:

CASE HISTORY #1 ". . . tool life increased 100% at normal speeds . . . better finish . . . shop people liked it."

CASE HISTORY #2 ". . . tool life increased up to 200% . . . uniformity of finish remained constant . . . considerably increased speeds without sacrifice to finish."

CASE HISTORY #3 ". . . tool life increased two to four times . . . we were able to tap 1" full internal pipe thread, almost impossible on regular material."

CASE HISTORY #4 ". . . new steel machines very well . . . finish excellent . . . tool life increased . . . 5 to 10% better production."

You too can get greater economies in your machining operations with new J&L free-cutting "E" Steel. "E" Steel is available in three grades: E-15, E-23 and E-33, each within the composition limits of the standard bessemer screw steels and with similar tensile properties. All standard sizes and shapes are available. For further information write for your copy of our new booklet: "J&L 'E' Steel."

Jones & Laughlin Steel Corporation
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Name_____

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Bendix Products

CREATIVE ENGINEERING

GEARED TO QUANTITY PRODUCTION

HYDROVAC

THE POWER BRAKE PREFERRED ABOVE ALL OTHERS!

More than two million installations are certainly undeniable proof of any product's popularity. In the field of power braking it means that one —the Bendix Hydrovac—is preferred above *all* others. Such overwhelming acceptance by the men who service, drive and own the nation's trucks is impressive enough in itself. It further suggests, however, that Hydrovac* power braking might very profitably be included as original equipment by most manufacturers. If you are interested in taking advantage of this great pre-sold market, write the factory direct for details on Hydrovac—the undisputed leader in power braking.

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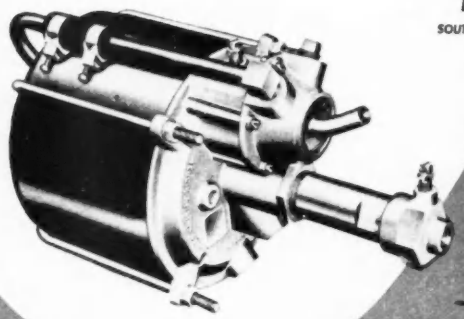

Continental Emergency and Parking Brake

Bendix® Power Braking System for Cargo Trailers

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OF THE BASICS
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MOTOR VEHICLES

Bendix® Automatic Clutch and Gear Shift Control Systems

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AUTOMOTIVE INDUSTRIES

The Authoritative Technical and News Magazine That Gives Comprehensive Coverage, Domestic and Foreign, of These Industries:

Passenger Car	Engine	Parts and Components
Truck	Body	Accessory
Bus	Trailer	Production Equipment
Aircraft	Road Machinery	Service Equipment
Tractor	Farm Machinery	Maintenance Equipment

High Spots of This Issue

The Union Camel Edging Into Industry's Door

Reminiscent of the camel in the old fable who eventually took over his master's tent, UAW-CIO has its nose well into the automotive industry's door since gaining a pension plan financed wholly by the Ford Co. Some serious problems which this step by the union creates are analyzed in the article, starting on page 25.

700 Exhibitors at French Automobile Show

The end of State control over types of cars dictated to be built marked the 36th French Automobile Show in Paris. Production increased and new models resulted. Here is given a good accounting of offerings by Renault, Citroen, Ford, Panhard, Hotchkiss, Mathis, and other manufacturers, as evidenced at the Show. Page 26.

Large Dust Tunnel For All Types of Vehicles

Providing dust conditions of all types, and large enough to accommodate buses and trucks, this first-of-its-kind glass and aluminum test chamber is a newcomer at the Fram Corp. Its versatile operating features make enlightening reading, page 33.

Metal Show Most Successful to Date

More than $8 million worth of equipment displayed in over 220,000 sq ft of floor space by 362 exhibitors was witnessed by a record of close to 69,000 visitors at the 31st National Metal Congress and Exhibition held last month. This article gives not only a resume of major exhibits but also presents abstracts from some of the papers presented at the technical sessions. Turn to page 34.

Problems of Aircraft Producibility

At the SAE National Aeronautical Meeting held recently in Los Angeles, factors entering into plane and engine design were given a thorough hearing. This article reports on the great problems of producibility there discussed, primarily concerning requirements of industrial mobilization in case of war. See page 40.

23 New Product Items And Other High Spots, Such As:

How alloy iron ring lands are bonded to aluminum pistons; an improved locking differential; laminated hardwood parts for station wagon bodies; how Pontiac prefinishes bumper bars; the Fuller torque divider; and a statistical report on the United States near-44-million total vehicles.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

NEW BOOKLET—

Overcoming Alloy Hazards

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It's true that you may go on specifying and buying alloy steel for years without a slip. Without getting the wrong specification. Without an alloy failure.

But it's equally true that one alloy *looks* just like another and there are plenty of chances for error before an alloy steel shipment reaches you.

This book shows you how to guard against alloy errors. How to overcome the hazards caused by errors anywhere along the line. It explains the steps you can take yourself and the steps we take to protect you.

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NEWS *of the* AUTOMOTIVE INDUSTRIES

Vol. 101, No. 10 **November 15, 1949**

Ford Announces New 1950 Models

Among the engine improvements in the 1950 Fords (see cut on this page) are a new camshaft timing gear made of laminated composition material, replacing the former aluminum gear; new autothermic type pistons; new camshaft with a longer opening and closing ramp for eliminating tappet noises. A new three-bladed fan on the V-8 engine replaces the former four-bladed fan, and fan speed has been reduced to 9/10 of the engine speed. New narrow fan belts are used and drive has been rearranged so each of the two belts drives three pulleys. Oil economy is said to have been increased by the addition of an oil squirt hole in the connecting rods, new cylinder wall finish, and a rubber seal ring on the intake valve stem guide of the V-8 engine. The car has new bumper guards, a ribbed rear bumper, and bumper supports for added strength.

FORD'S NEW FIFTY

The 1950 Ford custom de luxe Fordor sedan introduces a new treatment of the grille and parking lights, a new crest, a new ornamental rear deck handle and lock, and new instrument knobs. In addition the Ford V-8 and six-cyl engines have been improved.

New K-F Smaller Car Due Next Summer

Reports that the new smaller car to be built by Kaiser-Frazer next year will be ready for announcement by early spring are "too optimistic," according to a reliable company source. The best guess is that it will appear sometime next summer. Plans for the car leaked out of a secret meeting for dealers at Detroit. The car is not a $1000 automobile, but will be designed to compete in the Ford-Chevrolet-Plymouth price class. It will be a standard-size, five-passenger car, offering exceptional gasoline economy, according to Henry J. Kaiser, board chairman. The company is staging a national contest to name the car, with $200,000 in prizes.

New Car Registrations at All-Time Peak

With the all-time production record for cars and trucks shattered late in October, the industry early this month passed another milestone when it exceeded the all-time annual registration mark for new automobiles. It is estimated that the first week in November, registrations passed the previous high record of 3,880,206 units established in 1929, according to R. L. Polk & Co. Registrations of nearly 460,000 new cars during September helped bring the total for the first nine months of this year to 3,548,296. The September showing was down only 19,000 from the record high month this year set in August, and was the second highest of the year. Polk estimates that new car registrations this year will pass the four million mark easily if interference from the steel and coal strike is not too great. Truck registrations took a surprising turn during September by shooting upward to the highest level for the past year, even exceeding September of 1948. Registrations of 89,253 new trucks for September of this year was the highest since August, 1948. Total truck registrations for the first nine months of this year, however, are abut 88,500 units behind the same period a year ago.

Chevrolet to Adopt New Carburetor

Chevrolet will use the new type model B Rochester carburetor as standard equipment on all models next year. About 10,000 of the units are being used on the tail end of the 1949 model run, and will be put on all cars built after the first of December. The Rochester carburetor was first used on the Oldsmobile Rocket engine when it was introduced more than a year ago. It is of simplified design and has only four parts requiring service.

Steel Settlements Shorten Car Factory Shutdowns

Settlements of labor difficulties in the steel industry, coming a little earlier than had been expected generally, certainly will shorten the period during which automobile and truck production will be either halted in some cases or curtailed in others. There had been some expectations that certain plants might be down from four to six weeks, but that now appears to be highly unlikely. Ford suddenly changed its plans and continued production of Ford and Mercury cars instead of halting assembly on the 15th as had originally been planned. Manufacturing is expected to continue all of this month, at least, with December schedules uncertain. Lincoln, however, went out of production in mid-November for an indefinite period. GM has been operating on reduced schedules with four-day weeks in some plants, but expects to keep going at least all of November and undoubtedly will be down then in any event for model changovers in most of the divisions. Chrysler, DeSoto and Dodge production halted Nov. 4, and when production starts again it will be on 1950 models. Plymouth Div. will operate through Nov. 25 and then will go down for a model changeover. Hudson and Packard were expecting to continue production all this month, but Nash was looking for a suspension of operation shortly after the

BRAND NEW DIAMOND

Powered by a six-cyl, 140-hp engine, with 427 cu. in. piston displacement, this new Diamond T model 650T tractor has a total chassis weight of about 8000 lb. Large hydraulic brakes are power-actuated with Bendix 9½ in. long-stroke Hydrovac booster, and rear brakes are of the Wagner FR type. Transmission is the Clark 290VO five-speed overdrive, with helical constant-mesh 2nd, 3rd and 5th gears, geared for road speeds to 60 mph in overdrive.

middle of the month, and Studebaker was also in a very uncertain position. Kaiser-Frazer, out of production since the last week in October, still was undecided about when operations again would resume. Even though steel was starting to flow from the mills during the second week in November, an industry source estimated that it would be at least 60 days before prestrike volume of steel again is attained. However, shortages of certain types of steel are certain to plague the industry for the next three months at least.

Assembly of K-F Cars to Halt in India

Kaiser-Frazer is pulling out of the Indian market so far as building cars there is concerned. The K-F assembly plant in India, owned and operated by Indian interests, has been sold to the Rootes Group of England. Most of the materials had been shipped from Willow Run for assembly in India, and stocks on hand will be used to complete cars in process. The reason for the abandonment of the Indian operation, according to one K-F spokesman, is that the government there is demanding the impossible in the matter of supplying a large percentage of components from Indian manufacturers. He also stated that the dollar exchange problem was an important factor in the decision to suspend operation.

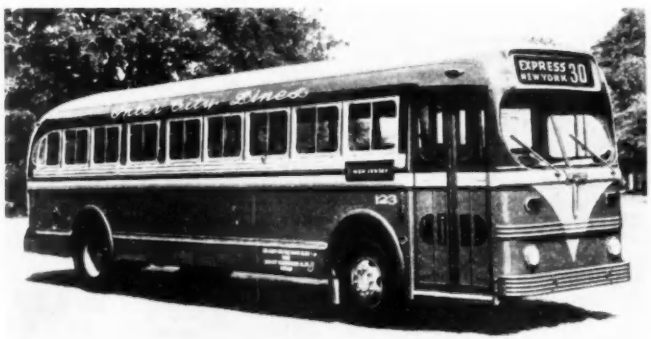
GM and Chrysler Report Record High Earnings

Both GM and Chrysler have reported all-time record earnings for the first nine months of this year. GM shattered all automobile industry records for sales, income, production and payrolls in the third quarter. Earnings for the three months were $198,735,386, bringing the total for the first nine months to more than half a billion dollars—$502,414,029. Totaling $190,232,055, a cash dividend recently voted by GM to 436,005 holders of its common and preferred stocks is considered to be the largest cash dividend in the history of U. S. industry. GM also intends to retire its long-term debt of $125 million next month, 17 to 27 years before the notes are due, out of corporate funds.

Chrysler earnings for the first nine months of this year also hit all-time records with $97,651,453. The total includes more than $13 million in dividends from foreign subsidiaries which could not be transferred to this country previously. Total earnings of the United States operation for the period was more than $84.5 million, or 5.26 per cent of sales.

Ford Accepts GM Plan for Transmission Fluid

Ford is the first automobile manufacturer to join in the GM plan for a uniform automatic transmission fluid. The company's Lincoln-Mercury Div. is recommending that only the certified fluid bearing the designation "Automatic Transmission Fluid A" be used in the Hydra-Matic transmission on Lincoln cars. The GM plan involves submission by oil companies of a standard fluid to the Armor Research Foundation for laboratory tests after which it is put through service tests at the GM proving ground. If it meets all qualifications, it is certified and the designation is stamped on the container along with the oil company's brand or trade name.



NEW WHITE FOR THE SUBURBANITE

The White Motor Co., as part of its 1100 Series, recently introduced this new White 1100 Suburban bus in 41 and 45-passenger models. The operator can choose between the 12-cyl White underfloor engine and the six-cyl Super Power engine, teaming either of these units with the White Hydro-Torque Drive automatic transmission.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Plymouth Using New Type Aluminum Brake Shoe

The Plymouth Div., Chrysler Corp. is currently using an aluminum brake shoe. The move was made as an expedient when the steel shortage curtailed the supply of regular steel type brake shoes. However, it is not known whether the aluminum shoes will be continued in production when an adequate supply of steel shoes is available. The substitution indicates, however, that Chrysler, may have been planning to make the switch to the aluminum type some time in the future, and was forced to it a little earlier than expected by the steel shortage.

Decline in Corporate Profits in Second Quarter of 1949

Corporation profits declined for the third successive quarter during the second quarter of 1949, the Commerce Dept. reports. For all corporations, the quarter's profits were estimated at $6.6 billion before an estimated $2.5 billion tax take. Automobile manufacturers were among the three major groups to show an increase in profits because of sustained high production and sales. Effects of reduced corporation profits for the quarter showed up immediately in the scaling down of the estimated national income rate from $226 billion to $223 billion.

L-O-F Producing Tinted Glass for Automobiles

Libby-Owens-Ford announces that it is now in production of a new type tinted safety glass for automobile windshields and windows. The product is produced in either flat or curved shapes. The company reports that the glass has been tested and passes light transmission requirements of the American Standards Association. Advantages claimed for the new product is that it cuts glare and heat from the sun's rays and reduces fading of upholstery by screening out a large percentage of ultra-violet rays. The glass has a bluish-green tint. At least two GM divisions are known to have done considerable experimental work with tinted glass.

New Transport Helicopter by Bell Aircraft

A helicopter capable of carrying 12 passengers and a pilot at speeds of more than 100 mph was announced by a Bell Aircraft Corp. official, who said that prototypes of the big craft "have been flying successfully for three years at the Bell plant . . . ." According to David G. Forman, manager of the firm's helicopter division, the craft is known as the Feeder-Liner, and will provide rapid, large-scale transportation between congested metropolitan areas, outlying airports and suburban sections. With a fuselage constructed entirely of metal, the huge Bell helicopter has been engineered to use either a 600 or 800-hp engine. It can be equipped with conventional helicopter wheels or with amphibious landing gear, Mr. Forman explained.

ENERGY ON THE MOVE

Specially designed by D. W. Onan & Sons, Inc., Minneapolis, Minn., and Boeing Airplane Co., the Onan "Energizer" shown above duplicates on the ground all the electrical power provided in flight by the Stratocruisers' generators. The Onan "Energizer" has a 140 hp six-cyl Hercules gasoline engine, model HXE, to drive two generators, one 50kw, d-c, the other, 15kw, a-c, and will supply power to run all the plane's instruments and accessories, air-conditioning, lighting, communications system, and start all engines.

RFC Official Clarifies Kaiser-Frazer Loan

The confusion surrounding the two recent loans made by RFC to Kaiser-Frazer has been clarified somewhat by an official statement from Harley Hise, RFC chairman. He stated that collateral for the $34.4 million loan, which is to mature in 10 years, is a first lien on all physical assets of the company and its subsidiaries including land, buildings, machinery and equipment at the Willow Run plant which have a recovery value as a going concern of more than $58 million. Further security is the pledging of all capital stock of all wholly-owned subsidiaries: K-F Parts Corp., K-F Sales Corp., K-F Export Corp., and K-F Canada, Ltd. In addition, both the $34.4 million loan and the $10 million subsequent loan to K-F Sales Corp. are to be secured by a $15 million guaranty by Henry J. Kaiser Co. and Kaiser Engineers, Inc., to be secured by collateral acceptable to RFC with a market value of not less than $10 million.

Ford Report Indicates High Earnings Level

Earnings of Ford Motor Co. cannot be determined accurately since no public financial report to stockholders is issued, but the company's annual report filed with the Massachusetts State Tax Commissioner indicates that the profit showing last year was excellent. Capital surplus at the end of last year showed an increase of $77.7 million over the same date a year previous and during the same period reserves rose $2.8 million. The statement shows further that on last Dec. 31, the total assets of the Ford Motor Co. stood at $1,149,240,689, an increase of $123,507,204.

API Awards 1949 Gold Medal to J. Howard Pew

J. Howard Pew, director and retired president of the Sun Oil Co., Philadelphia, and one of the founders of the American Petroleum Institute 30 years ago, was the 1949 recipient of the Gold Medal for Distinguished Achievement awarded annually by the Institute to an outstanding American. Mr. Pew received the Gold Medal in person at the API's 29th annual meeting in Chicago on Nov. 9.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Chrysler Offers Low C.R. Heads for Export Use

The trend toward higher compression engines in this country has made it necessary for manufacturers building cars for export to provide special cylinder heads with lower compression ratios for vehicles sold overseas where higher octane fuels are not generally available. A survey by Chrysler shows that very few countries could make use of compressions 7.0 or 7.25 to 1. A fairly large percentage of the foreign market can use a ratio of 6.7 to 1, while more than 50 per cent need a ratio of about 6.25 to 1. To simplfy manufacturing schedules, two types of cylinder heads are now provided for both passenger cars and trucks sold by Chrysler Export. They will have ratios of approximately 6.7 to 1 and 6.25 to 1.

IMPERIAL ELEGANCE

The new Chrysler Crown Imperial limousine, available in either the limousine or eight-passenger sedan models, is styled for luxury interior elegance. An exclusive feature is the new Chrysler self-energizing hydraulic disk brake. The wheelbase is 145½ in. and overall length is 229⅜ in. It is powered by the 135-hp Spitfire engine.

George Fisher Made Head of Keller Motors

George M. Fisher, formerly head of body manufacturing for Studebaker, has been elected president of Keller Motors Corp. to succeed George D. Keller who died recently. He joined Keller Motors as a director and vice president in charge of production after leaving Studebaker last February.

Carlson Made Assistant to Oldsmobile Chief

L. F. Carlson, formerly national merchandising manager for GM's Oldsmobile Div. has been made executive assistant on the administrative staff of S. E. Skinner, Oldsmobile general manager and GM vice president. His primary assignment will be public relations, but he will also function in an advisory capacity on national merchandising programs. At the same time, the appointment of R. E. Gifford as advertising manager was announced. He was formerly engaged in public relations activities for the division. The company also announced that O. F. Frost has been made sales promotion manager.

Farm Consumption of Petroleum Rose in 1948

Farm consumption of liquid petroleum fuels in 1948 rose to 8213 million gallons, according to the Dept. of Agriculture. Farm use during the previous year was 7548 million gallons. Tractors still account for the highest rate of use, consuming 3278 million gallons last year, as compared with 2980 million gallons during 1947. Farm automobiles, which consumed 1978 million gallons in 1947, increased motor fuel usage to 2120 million gallons last year. Motor trucks accounted for 925 million gallons, as compared with 853 million gallons in 1947. The remainder, in both years, was consumed by stationary and mounted engines and household and miscellaneous uses.

Ford Modifies Design for Taxicab Use

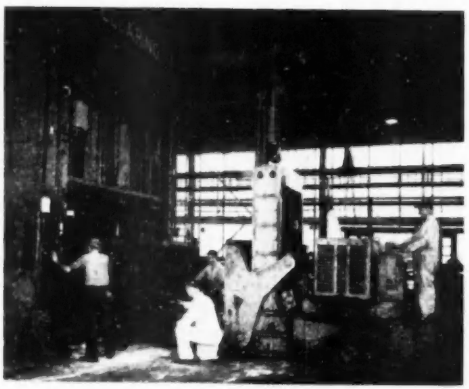
Ford has submitted a sample of an especially designed taxicab to New York officials. The car is similar to the standard four-door sedan so far as the chassis and exterior are concerned, but has an especially designed interior providing space for four passengers, with a separate compartment for the driver.

Studebaker Earnings Show Large Gain

Studebaker Corp. earnings have kept pace with the company's excellent production record during the past year. The most recent financial report shows earnings for the first nine months of this year of $17,242,245, compared with $13,392,724 for the same period last year. Sales of passenger cars and trucks total 228,010 units through Sept. 30, compared with 170,577 for the same period in 1948.

DIE LIFTER

An Automatic lift truck with a 50,000 lb. capacity removes a 35-ton die from one of the giant presses in Studebaker's new press room. The die is being moved out to make way for another die. Trucks such as these can change huge dies in about a third of the time formerly needed. Presses are idled for about an hour and a half while dies are changed.



Hercules Adds Three New Gasoline Engines

The Hercules Motors Corp., Canton, Ohio, has added three new 4-cyl gasoline power units, models JX4E, JX4C and JX4D, to its line. The models JX4E—3½ in. bore and 4¼ in. stroke and 164 cu in. displacement; the JX4C—3¾ in. bore and 4¼ in. stroke and 188 cu in. displacement; and JX4D—

4 in. bore and 4¼ in. stroke and 214 cu in. displacement, reduce the power spread which has existed between the model IXB5—4-cyl power unit of 133 cu in. displacement, and the model QXC5—6-cyl power unit of 221 cu in. displacement.

Name Gall Vice President of Hudson of Canada

C. R. Gall has been appointed vice-president of Hudson Motors of Canada, Ltd. He has been associated with Hudson since 1928, and has been general sales manager of the company for the last 10 years.

Packard Nine-Months Net Shows Small Decline

Increased costs and a narrowed profit margin are revealed by the Packard financial report for the first nine months of this year. It discloses that while car shipments for the period totaled 89,653 units, compared with 64,962 for the corresponding period of last year, net earnings were slightly under the first three quarters of a year ago. Net income through Sept. 30 of this year was $9,111,568, compared with $9,488,336 in the same period of 1948. Total sales were $187,197,763, a new peacetime high, compared with $164,325,977 in the first nine months of 1948.

Surface Finish Standards Available at Cost

Geometric surface finish standards for improved control in standardization of finishes, developed jointly by GM and Chrysler research groups, will be made available to all industry at only the cost of reproduction. The standards are 2 by 3 in. ruled blocks of silver clad steel on which .005 in. of gold is plated. The standards cover 27 different roughness values from 1 to 1000 microinches. The ruled surfaces have been designated as geometric surface finish standards and are to be the basis for surface finish standards for both GM and Chrysler.

GM to Review Pensions With Two Unions

GM has agreed to discussions with the UAW and UEW on pension and insurance plans. The company's contracts with the two unions do not expire until next May 29 and the talks will be merely preliminary to contract negotiations next year. A GM spokesman says that in no case will there be any changes in the contract before that time, and the meetings are not to be interpreted as bargaining talks. Both unions requested the meetings.

Hudson Earnings Show Increase Over 1948

The Hudson Motor Car Co. has reported a sizable increase in earnings for the first nine months of this year over the same period a year ago. Net profit through Sept. 30 of this year was $7,632,807, compared with $5,497,199 for the first nine months of 1948.

1949 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Totals 1949	Totals 1948
January	326,019	104,599	658	431,276	405,663
February	324,547	101,700	418	426,665	383,002
March	402,402	115,171	545	518,118	492,034
April	436,392	106,212	514	543,118	438,090
May	394,763	86,200	564	481,467	338,538
June	493,882	99,126	632	593,640	431,046
July	483,261	95,348	439	579,048	474,556
August	557,370	99,850	444	657,664	461,335
September	534,493	91,389	303	626,185	413,537
Total Nine Months	3,953,069	899,595	4,517	4,857,181	3,837,819

1949 FACTORY SALES TO DOMESTIC AND FOREIGN MARKETS*

	Passenger Cars		Trucks		Buses	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
January	312,199	13,820	91,282	13,317	618	40
February	310,343	14,204	88,540	13,160	326	92
March	385,834	16,568	99,925	15,246	423	122
April	422,149	14,243	91,808	14,404	494	20
May	380,489	14,214	75,518	10,682	511	53
June	480,009	13,873	89,174	9,952	522	110
July	471,752	11,509	85,427	9,921	399	40
August	514,630	12,740	89,989	9,861	420	24
September	521,524	12,969	82,487	8,902	284	19
Total Nine Months	3,828,929	124,140	794,150	105,455	3,997	520

* Data from Automobile Manufacturers Association.

Willys Promotes C. C. Smith and DeSmet

C. Coyle Smith has been appointed assistant to the first vice president of Willys-Overland Motors, Delmar G. Roos. He formerly had been manager of the projects planning and research department. Edgar C. DeSmet has been appointed to the newly-created post of director of body engineering for Willys-Overland. He will be responsible for planning and directing of all body engineering at Willys, in addition to his present duties as head of the styling department.

Avco Reorganizes Top Management

Following the resignation of R. C. Cosgrove as executive vice president of the Avco Manufacturing Corp., Victor Emanuel, president, stated that the office of vice president has been abolished. Operating division heads who previously reported to Mr. Cosgrove will report directly to the president.

Canadian Develops New Alloy for Jets

A Canadian scientist has developed an alloy that may give new impetus to Canadian production of jet aircraft engines. The alloy was developed by Harold V. Kinsey, a Canadian federal mines bureau metallurgist. The new alloy is tough enough to withstand the searing heat of a jet engine that distorts most other metals, mine bureau officials said. It is called Kinsalloy in honor of Mr. Kinsey. A combination of nickel, molybdenum and aluminum, it will shortly be tested in actual engines.

Ford Appoints Singleton Assembly Plant Chief

The Ford Motor Co. has appointed William D. Singleton production manager of all Ford Division assembly plants. He had been manager of Ford's plant in Chester, Pa., since February, 1948, and is succeeded in that post by William B. Smith who has been named acting plant manager.

NEWS *of the* AUTOMOTIVE INDUSTRIES

British Car Exports to U. S. Off Sharply

Despite a sizable increase in production of British passenger cars during the first six months of this year, export of cars to this country dropped more than 50 per cent. Total automobile production in the United Kingdom during the first half of this year rose to 196,709 units with about 100,000 being exported. Shipments to America, however, dropped to 3025 during the period, compared with 8285 a year ago. Devaluation of the pound sterling, however, is expected to result in a moderate increase in importation of British cars in this country during the last four months of this year.

on a site of approximately 480 acres. The trustees under order of the Federal Court and with approval of WAA have exclusive right to sell the land, buildings, machinery and equipment. If the plant is not sold by Dec. 4, it reverts to WAA for disposal.

Automobile Old Timers Cite Five

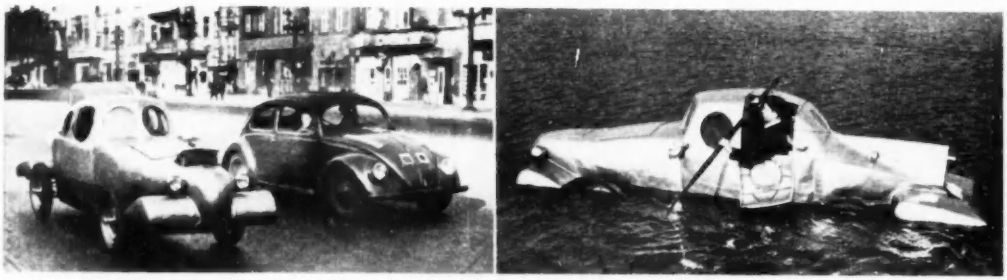
Peter M. Heldt, long time engineering contributor and former engineering editor of AUTOMOTIVE INDUSTRIES was among five "Old Timers" to receive formal citation by the Automobile Old Timers in New York City on Oct. 18. Mr. Heldt was acclaimed for his contributions to automotive engineering.

Reo Fiscal Year Loss Exceeds $1 Million

Reo Motors, Inc. during the first nine months of this year had an operating loss of $1,786,079. After estimated tax carrybacks, however, the loss was reduced to $1,118,079. About $260,000 of the deficit represents a write-down in inventory.

Tire Industry Predicts Further Price Rise

The recent 3½ per cent increase in replacement tire prices may be only the softening up for another advance a little later. Talk in the tire industry now is that the increase was inadequate to meet current costs and that another boost may be necessary by the first of next year, ranging from another 3½ per cent to as high as 6½ per cent.



Acme

STREET OR STREAM?

Paul Moench, Berlin, Germany, has built the amphibian automobile, shown above, in which he hopes to travel around the world. He plans to build an amphibian trailer to carry food, drinking water, and gasoline, with room for one passenger. The combination vehicle is powered by two two-stroke DKW engines. At the left Herr Moench is shown traveling down the Bismarck Strasse in the British sector of Berlin, and at the right he is sailing on the Wannsee in the American sector.

Detroit Company Buys Portsmouth Steel

The Detroit Steel Corp. has agreed to buy the physical assets and the steel business of the Portsmouth Steel Corp., subject to ratification by stockholders of both companies. If the agreement is ratified, plans call for a large scale expansion of finishing facilities at Portsmouth, O., to be completed late in 1950. The Portsmouth unit will maintain the status of a separate corporation.

Tucker Plant Offered for Sale By Trustees

The trustees of the Tucker Corp. have put the huge Tucker plant in Chicago up for sale. They have invited bids for purchase of the land, buildings and certain machinery and equipment. The plant contains more than 6.3 million sq ft of floor space and 14 major buildings

and received joint recognition with K. T. Keller, Chrysler president; Harvey Firestone, Jr., chairman, Firestone Tire & Rubber Co.; Wm. E. Holler, formerly general sales manager, GM's Chevrolet Motor Div.; and Alfred Reeves, advisory vice-president of the Automobile Manufacturers Association.

Standard Steel Spring Buys Falls Spring & Wire

The stockholders of the Standard Steel Spring Co. of Coraopolis, Pa., and Falls Spring & Wire Co. of Detroit will soon be asked to vote on an agreement reached by directors of the two firms under which Standard Steel would acquire all assets of the Detroit company. The Falls Spring & Wire Co. is a large supplier of cushion seat springs, tubular products, and seat back and mechanical springs to the automobile industry.

Pratt & Whitney Aircraft Completing New Jet Lab

A new $12 million laboratory, designed and built expressly for test of experimental jet engines, will be named the Andrew Willgoos Turbine Laboratory, the United Aircraft Corp., has disclosed. Built by the Pratt & Whitney Aircraft Div. of the corporation, the laboratory is complete, except for the installation of a few major pieces of equipment, and will go into operation within the first three months of 1950. It is a windowless building, six stories high, and 400 ft long.

Bendix Appoints Goepfrich Chief Brake Engineer

Rudolph A. Goepfrich has been appointed chief engineer of the automotive

brake department, Bendix Products Div., Bendix Aviation Corp. He formerly had been assistant chief engineer. He has been succeeded in his former post by Clark R. Lupton, who was formerly project brake engineer.

Federal Expands Line of Forward Control Chassis

Following the introduction of the initial F-105 heavy-duty forward control chassis described in AUTOMOTIVE INDUSTRIES, Sept. 1, 1949, Federal Motor Truck Co., has announced forward control vehicles in six models, including the F-105 and two Diesel-powered chassis. These models are produced primarily for bus service, but the basic chassis can be used for special applications requiring forward control equipment. The range of GVW ratings for the line runs from 18,500 to 23,000 lb. Wheelbases are shorter than on standard Federal models, ranging from 122 in. for short wheelbase units to 240 in. for large buses. Hydraulic brakes are standard on all models, with air brakes offered as optional equipment on all models except F-100. Five-speed transmissions, either one to-one or overdrive in fifth, are standard on all models except F-100 and F-102, and optional on F-102. Cast wheels and bus-type springs are standard equipment on all models. A 12-v electrical system is available as optional equipment. The new Federal forward control models are:

Model	GVW	Engine
F-100	18,500 lb.	Hercules JXBF (std) JXCF (opt)
F-102	20,000 lb.	Hercules JXCF
F-104	20,000 lb.	Hercules JXDF (std) JXLDF (opt)
DF-104	20,000 lb.	Hercules DJXHF (Diesel)
F-105	20,000 to 23,000 lb.	Continental T-6427F (std) T-6371F (op
DF-105	20,000 to 23,000 lb.	Hercules DWXLD (Diesel)

Waste Conference at Purdue Nov. 29-30

The Fifth Industrial Waste Conference will be held Nov. 29-30 at Purdue University, Lafayette, Ind. It is sponsored by the School of Civil Engineering, the Technical Extension Div., and the Indiana State Board of Health.

Union Fight Poses Threat to GM

The big fight between the right and left wings in the CIO has resulted in a potential troublesome problem for GM. The reason is that workers in its Delco-Remy and Packard electric divisions are members of the UEW which was expelled from the parent CIO organization.

NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1949 Nine Months' Totals.

MAKE	September 1949	August 1949	September 1948	NINE MONTHS Units 1949	Units 1948	Per Cent of Total 1949	Per Cent of Total 1948
Chevrolet	31,084	29,698	23,704	261,548	229,421	36.48	28.48
Ford	21,345	19,933	18,979	138,350	181,592	19.30	22.54
Dodge	10,523	10,180	10,583	87,903	87,511	12.27	10.86
International	8,852	8,331	8,504	69,853	101,193	9.74	12.56
G. M. C.	7,621	7,551	7,192	61,827	54,747	8.62	6.80
Studebaker	4,544	4,950	4,290	42,611	37,754	5.94	4.69
Willys-Truck	1,223	1,253	2,284	15,128	20,615	2.11	2.56
Willys-Jeep	877	948	4,747	11,616	40,173	1.62	4.99
White	713	615	861	6,150	9,036	.86	1.12
Mack	650	603	669	4,821	7,839	.67	.97
Diamond T	382	369	947	4,047	8,596	.56	1.07
Reo	424	276	756	3,097	9,002	.43	1.12
Divco	337	237	426	2,756	4,535	.38	.56
Autocar	92	105	186	1,249	2,074	.17	.26
Brockway	132	110	208	1,130	2,285	.16	.28
Federal	76	57	237	938	3,458	.13	.43
Crosley	39	56	184	723	2,014	.10	.25
Pontiac	70	21		344		.05	
Kenworth	28	24	38	295	324	.04	.04
F. W. D.	42	19	40	275	693	.04	.09
Sterling	18	14	10	177	341	.02	.04
All Others	181	189	255	2,246	2,384	.31	.29
Total	89,253	85,539	85,108	717,084	805,584	100.00	100.00

* Based on data from R. L. Polk & Co.

Murray Corp. Earnings Highest on Record

The net profit of the Murray Corp. of America during the fiscal year ending Aug. 30 was the highest on record. Earnings for the year stood at $6,802,656 on sales of $97,844,203, also the highest on record. The company's financial report takes note of the fact that Ford is building new stamping facilities at Buffalo for its eastern assembly plants, and that a $2 million contingency reserve has been appropriated as a result in the event of possible loss of volume in 1951.

Motor Products Corp. to Build Ohio Plant

Motor Products Corp. will build a new plant at Marion, O. The company has arranged for a $2.5 million loan from the New York Life Insurance Co. on a three per cent promissory note due in 1961.

NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1949 Nine Months' Totals

MAKE	September 1949	August 1949	September 1948	NINE MONTHS Units 1949	Units 1948	Per Cent of Total 1949	Per Cent of Total 1948
Chevrolet	108,320	114,034	58,834	762,898	529,277	21.50	20.56
Ford	72,537	77,660	53,654	569,001	310,745	16.04	12.07
Plymouth	50,002	50,911	28,518	379,611	253,871	10.70	9.86
Buick	37,964	33,668	20,787	284,210	187,783	8.01	7.29
Pontiac	30,996	34,264	18,765	236,553	171,726	6.67	6.67
Oldsmobile	25,130	26,734	15,311	198,952	136,682	5.61	5.31
Dodge	29,011	29,733	18,075	192,090	160,212	5.41	6.22
Studebaker	19,871	13,820	11,185	143,567	108,862	4.05	4.23
Mercury	16,866	16,189	16,794	128,775	95,851	3.63	3.71
Hudson	9,640	11,480	3,851	110,599	81,151	3.12	3.15
Nash	9,843	13,763	4,830	101,967	87,051	2.87	3.38
Chrysler	12,081	12,956	8,694	94,741	79,439	2.67	3.09
Packard	8,725	9,857	6,012	76,319	58,813	2.15	2.28
De Soto	9,249	9,869	6,506	74,742	61,011	2.11	2.37
Cadillac	6,882	6,800	5,833	60,948	44,477	1.72	1.73
Kaiser	4,475	6,216	8,961	48,538	87,130	1.37	3.39
Lincoln	3,036	3,066	2,018	28,825	20,835	.81	.81
Willys	2,801	2,825	999	22,372	16,119	.63	.63
Frazer	720	1,008	3,606	14,255	49,617	.40	1.89
Crosley	678	778	2,468	8,373	21,376	.24	.83
British Ford	242	368	648	4,705	1,882	.13	.07
Austin	221	230	793	2,266	7,308	.06	.28
All Others	347	327	1,197	4,001	4,733	.10	.18
Total	459,647	478,556	296,339	3,548,296	2,574,861	100.00	100.00

* Based on data from R. L. Polk & Co.

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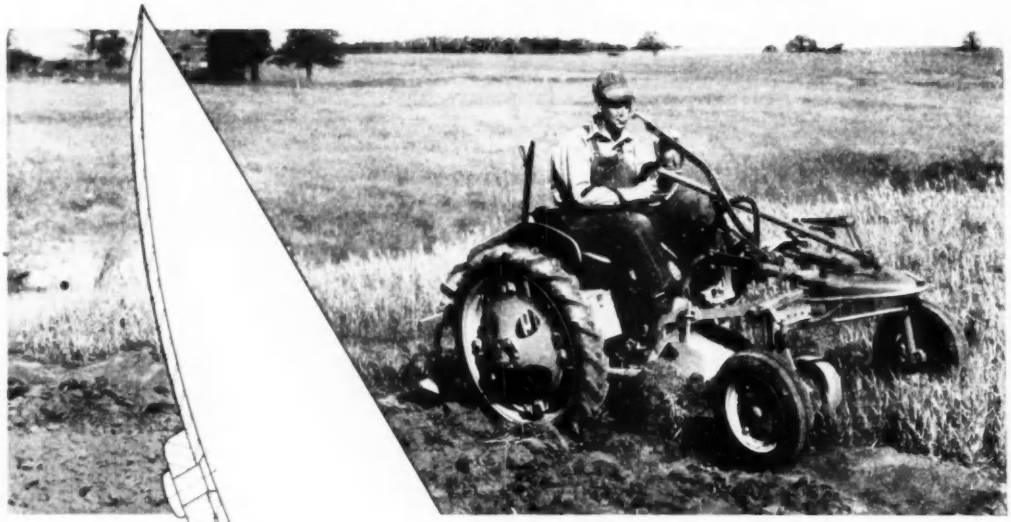
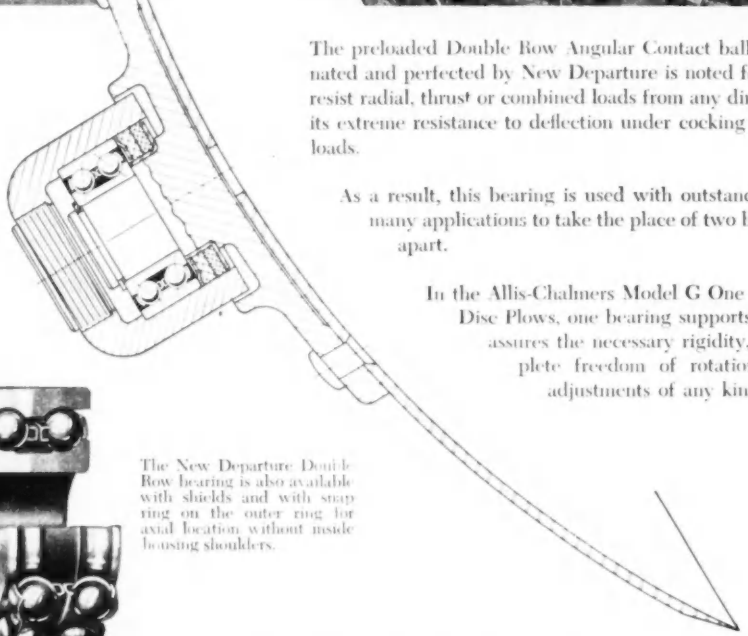




The preloaded Double Row Angular Contact ball bearing originated and perfected by New Departure is noted for its ability to resist radial, thrust or combined loads from any direction, and for its extreme resistance to deflection under cocking or misaligning loads.

As a result, this bearing is used with outstanding success in many applications to take the place of two bearings spaced apart.

In the Allis-Chalmers Model G One and Two-Way Disc Plows, one bearing supports each disc and assures the necessary rigidity, yet with complete freedom of rotation. No bearing adjustments of any kind are required.

The New Departure Double Row bearing is also available with shields and with snap ring on the outer ring for axial location without inside housing shoulders.

Nothing Rolls Like a Ball

NEW DEPARTURE
BALL BEARINGS

80

NEW DEPARTURE • Division of GENERAL MOTORS CORPORATION • BRISTOL, CONNECTICUT • BRANCHES IN ALL PRINCIPAL CITIES

By Leonard Westrate

The Union Camel

As It Moves Through Industry's Door

Taking Another Step with the Ford Agreement, UAW in Its Pension Drive Creates Serious Problems for Other Companies, Especially Smaller Firms.

THE camel has its nose in the tent. Like the humped beast in the old fable that poked its nose into its master's tent to get it in out of the cold, the UAW-CIO has succeeded in getting farther in the door of the automobile industry through its pension agreement with Ford Motor Co. Some observers expand the analogy by pointing out that the camel by successive stages finally managed to take over the tent entirely and crowded out the owner.

While the agreement between Ford and the union has created a lot of apprehension, especially among smaller companies, there still is some question about its acceptance *in toto* by the rest of the industry. Reaction in the automobile industry is hard to come by on any official basis, because no official wants to comment publicly, critically or otherwise, about the actions of a competitor or large customer. However, a fair sample of what the general thinking is can be indicated from interviews with leading executives and labor relations officials on a "no-quote" basis. Some of their ideas will be outlined farther on.

First, because the pension agreement is of such paramount importance and undoubtedly will be demanded throughout the industry, here are the basic provisions:

1. The retirement plan is financed solely by the company.

2. The pension part of the agreement is effective Mar. 1, 1950, with first payments due April 1, and runs for five years, during which time neither party may demand any changes, be required to bargain on provisions, or use pensions as a reason for strikes or lockouts.

The company agrees to pay into a pension fund $8\frac{3}{4}$ cents an hour for every covered employe for each hour he works, for the purpose of providing the specified benefits. But since the company assumes the responsibility of paying into the fund an amount sufficient to meet the benefit payments, as calculated by a qualified actuary, it may vary these payments accordingly.

The company has sole discretion as to how past service benefits shall be funded.

Administration of the benefit structure shall be by a joint committee composed of three members each from the company and the union, with deadlocked decisions to be resolved by a mutually selected impartial chairman. Functions shall be limited to such problems as methods of handling claims and payments, interpreting employes' rights, determining service credits, authorizing payments from the fund, acting on appeals, and similar functions.

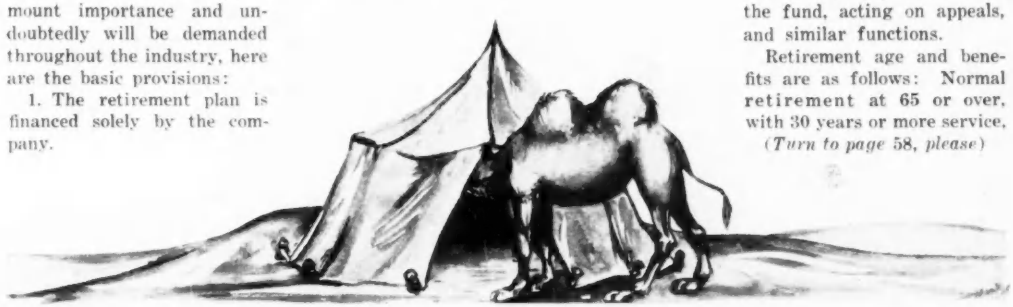
Retirement age and benefits are as follows: Normal retirement at 65 or over, with 30 years or more service,

(*Turn to page* 58, *please*)

Ford Hourly Wage Rates for 11-Year Period

Year	Toolmaker (highly skilled)	Millwright (skilled)	Major Assembler (semi-skilled)	Sweeper (unskilled)
1939	$1.25	$1.05	$ .95	$ .80
1940	1.25	1.05	.95	.80
1941	1.45	1.30	1.15	.95
1942	1.60	1.35	1.15	.95
1943	1.60	1.35	1.15	.95
1944	1.60	1.35	1.15	.95
1945	1.60	1.35	1.15	.95
1946	1.78	1.53	1.33	1.13
1947	1.89½	1.69½	1.44½	1.24½
1948	2.02½	1.82½	1.57½	1.37½
1949	2.02½	1.82½	1.57½	1.37½

NOTE: The above figures do not represent average straight time earnings or average gross hourly earnings which reflect such factors as the average work week, shift premium and overtime pay, nor do they take into consideration the cost of such other employe benefits as holiday and vacation pay, the cost of company-paid insurance, or pensions. Where spread rates exist, these figures are the top of the spread rate. While the wage rates were frozen by Government order during the war years, certain increases, among them increases for toolmakers and millwrights, were authorized retroactive to June 25, 1942.

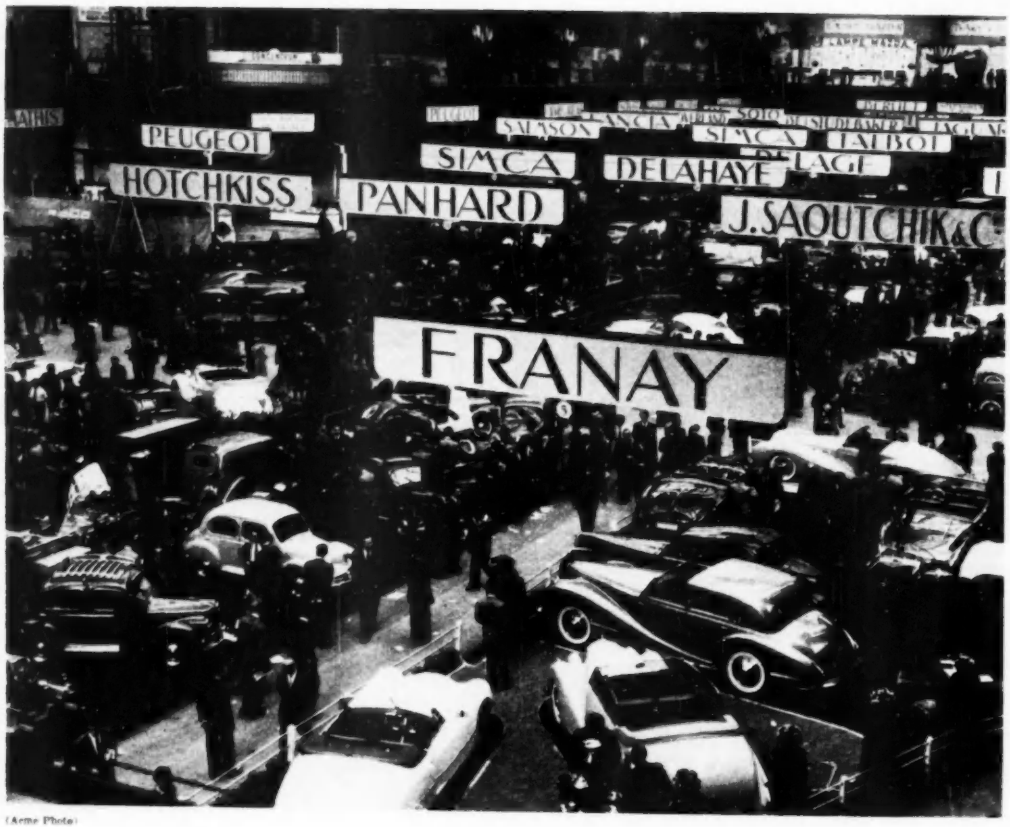


French Automobile Show

PARIS, FRANCE

THE 36th French automobile show with 700 exhibitors in the Grand Palais, on the Champs Elysées, differed from the two preceding postwar displays, in several important respects. It was primarily for passenger cars, with truck chassis admitted, and was followed by a second exhibition for utility vehicles only. For the first time prices were fixed, delivery dates could be given and, most important of all, it practically marked the end of State control.

With very few exceptions, manufacturers can buy their raw material in the open market and the situation is such that in a very short time there will be no bottlenecks. The "plan" under which each manufacturer had to produce a certain type of vehicle, decided on by government officials, can be considered as dead. If it served a useful purpose immediately after the return to peace, at a time when all transportation was lamentably short, manufacturers soon protested against irresponsible government officials dictating the type of automobile which the public should buy. Citroen—Michelin owned and controlled—torpedoed the "plan" when it decided to produce a small, two-hp automobile in addition to the two medium-priced cars allotted to the company. In doing this Citroen shot right under the four-hp state-controlled Renault which the "planners" had decided should be the big French production job.



(Acme Photo)

One of the lowest priced cars on the French market, this Citroen sedan has an aircooled two-cyl engine, front wheel drive, and a fabric covered roof and baggage compartment. Note how fabric is rolled up at top of rear window to provide for open roof.

Attracts

700 Exhibitors

Increased Production and New Models Follow Ending of Government Control Over Types of Cars to Be Built

By W. F. Bradley
Special European Correspondent for Automotive Industries

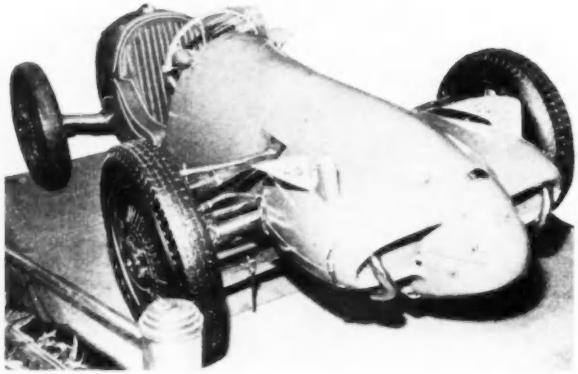
French automobile production will certainly reach if not exceed 300,000 vehicles for the year 1949. In 1938 production stood at 224,000 passenger cars and trucks. In 1948 it was 198,372, and at the end of the first six months of 1949 it had risen to 141,665. Reconstruction and re-equipment having continued on a rapid scale since then, the estimate of 300,000 for the year is a very conservative one. At present sheet steel forms a bottleneck, but in another year France should be producing all the sheet steel required for home markets and have a surplus for export. Two new continuous rolling mills are being installed, one at Denain, in the north, for hot rolling, and a continuous cold rolling mill at Montaterre, near Paris.

The industry will not be completely free from State control until government price-fixing of gasoline has been removed. There is free sale of gasoline at the prohibitive price of 68 cents per American gallon, this being a form of taxation which has the advantage of protecting the State-owned railways. A fight is being carried on for its reduction.

New models were not very numerous at the Paris Salon. Renault is well ahead on his original target of 300 rear-engined passenger cars per day. Citroen is continuing the four and six cyl front wheel drive models in production before the war in addition to its new low-priced car. Peugeot is in increasing production on the model 203 which also was shown as a prototype a year ago. There will be one "frameless" model, with a four cyl, valve-in-head engine, an overdrive in the transmission, a worm type rear axle, independent front suspension, and coil springs at the rear. There will be a number of body styles and also a light truck.

Ford is increasing production of the Vedette also shown for the first time a year ago. Simca, building under Fiat license, has changed the original five-hp side valve engine to a valve-in-head model. An eight hp engine of 73 cu in. has been added, this giving 40 hp compared with 32 for the previous model. The same model is handled as a sports car, the power output being increased to 50 hp. Panhard is working toward higher production on the Dyna a four passenger model with an aircooled opposed twin engine, light alloy being used very extensively in engine, chassis and body. Hotchkiss, while tooling up for production of the Gregoire flat-four light alloy job is continuing, in the meantime, with the same models as last year. In the higher price class Delahaye and Delage show only minor changes. Talbot has supplemented the six cyl with a four cyl of the same general design.

Outstanding in the show was Citroen's light car. The Citroen was presented a year ago, but practically



This Deutsch and Bonnet race car is powered by a Panhard 30.5 cu in. aircooled, opposed twin engine that uses torsion bar valve springs.

no information was given out concerning it. Now the factory is tooling up for its production. At the present time output is 10 per day, will increase to 50 per day by the end of this year, and rise progressively to the target of 500 per day.

A four passenger car with a wheelbase of 93 in., tread of 49½ in. front and rear, weighing 1095 lbs with tools, spare wheel and a gallon of fuel in the tank, the Citroen has a sustained speed of 37 mph with four passengers and baggage and is claimed to run 52 miles to the American gallon of gasoline. This figure is an average based on distances of 10,000 miles and more.

The new Citroen is provided with a simplified form of internal heating. The four seats are tubular frames with detachable upholstery. The body is sheet steel construction of the simplest type, the top is canvas and can be rolled down from the front to give an open car or rolled up at the rear to give access to the baggage compartment. Interior width is 47 in. and interior height 46 in.

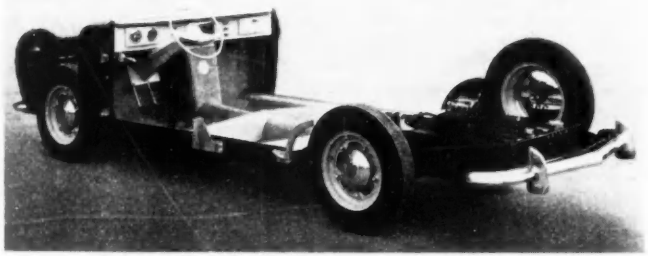
The engine is an air-cooled, opposed twin, with both bore and stroke of 2.44 in. and a piston displacement of 22.8 cu. in. The car has a single plate clutch, four-speed transmission (the fourth being an overdrive) and front wheel drive. Crankcase and transmission housing are light alloy. Forged nitrided cylinders have machined fins. The heads are light alloy and have intake and exhaust valves operated by pushrods and rockers. Cooling is provided by a shrouded turbine driven off the front end of the crankshaft, the air being led to the exhaust side of each cylinder. On the opposite side of the cylinder there is a collector by means of which hot air is led through a fabric sleeve to the interior of the car.

The generator is a special type, built by Citroen, mounted on the end of the crankshaft. There is no distributor, current being led direct to the plugs and there being a spark at each top dead center. One of these sparks is of course wasted. Behind the turbine there is a small oil radiator.

A single Solex downdraft carburetor is used, Model 22 ZAC 1. Manifolds are welded tubes. The starting motor is on top of the clutch housing and the ring gear is partly exposed.

The power plant is mounted at three points to the box section frame. Front brakes are on the shafts close to the differential housing. Drive is by means of short shafts with two simple universal joints and a sliding joint. There is a large diameter tubular cross member just behind the engine and this carries the rack and pinion steering and each end has trailing arms on which the steering knuckles are mounted. Front and rear arms are identical and between the two, mounted below the main frame members, is placed a housing containing a series of coil springs for the suspension. This suspension system is extremely flexible and is not supplemented by shock absorbers. Obviously it causes variations in the wheelbase, but according to those who have had opportunities of thoroughly testing the car it gives good results.

E. C. Mathis has produced a prototype featuring a flat six engine, a six-speed transmission and a six-passenger body. The Strasbourg factory being one of the few in France not yet completely rebuilt, the present program is to produce chassis only and fit them with custom bodies. The engine is a six-cyl opposed of 3½ by three in. with L-head and hydraulic tappets. Compression ratio is 7 to 1 and power output is 80 hp at 3800 rpm. The short stroke and the slide valves facilitate the placing of the engine across the frame. There is a carburetor for each group of



The Mathis chassis has a floor level below the side frame members and light-alloy rims with a five stud attachment instead of wheels. Total width of the car is 70 in. with a wheelbase of 105 in.

three cylinders. A three-speed transmission is fitted, but at the rear of the housing there is a relay which in addition to lowering the propeller shaft, gives three normal speeds and three geared up speeds. The frame is box construction, full width between the wheels and narrowed front and rear. The tunnel and the floor are an integral part of the frame, the passengers' feet being on the level of the lower flange of the side rails.

Both front and rear wheels are independently sprung by means of support arms and coil springs, with interchangeability for the great majority of the parts. A single coil spring is used at the front, while at the rear they are in pairs. Passengers are carried entirely within the 105 in. wheelbase, and with a total width of 70 in. there is ample room for three abreast. To facilitate demounting, the engine is fitted with two lifting eyes. After disconnecting at the rear, the power plant automatically tilts to clear the fixed bulkhead and can be lifted clear by being carried forward. Only three bolts have to be released to remove each of the four suspension units. Brake drums are 12 in. diam, with hydraulic brake operation. Instead of complete wheels, light alloy rims are used, with five-stud attachment. The spare wheel is carried vertically in the right hand side of the rear platform. The weight of the six passenger sedan does not exceed 2310 lb. Maximum speed is stated to be 90 mph.

The Claveau prototype, a V-eight front wheel drive of 140 cu in. piston displacement has undergone no change after long road tests. This is an almost exclusively light alloy job, the 6 passenger sedan weighing 2330 lb and will be supplemented by a smaller flat six on the same general lines.

After presenting a magnesium-alloy chassis body as a prototype for the last two years, Georges Irat has decided to get into production on a rather more conventional sports car with a tubular frame and a light alloy 91½ cu in. valve-in-head- engine developing 50 hp. With a wheelbase of 90 in. and a tread of 49 in. complete weight is 1200 lb.

Of the really cheap cylecar type runabouts, only Rovin appears to have got into production, with a two-passenger car having a rear mounted, water-cooled, opposed twin engine. Another in this class is the Julien with a single cyl, aircooled rear engine and an electrically welded open shell frame. Bernardet comes in this class with a four cyl two-stroke engine.

The first French, 30.5 cu in., midget racer is produced by Deutsch & Bonnet, making use of a Panhard aircooled opposed twin engine having torsion bar valve springs. This is a single passenger front wheel drive racer with transverse springs in front and torsion bars at the rear, all wheels being sprung independently.

A four cyl two-stroke engine of the flat type was shown by P. P. Roussey. This has two power cylinders

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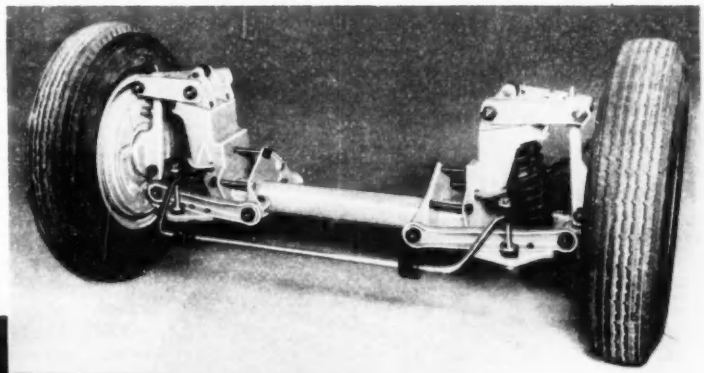
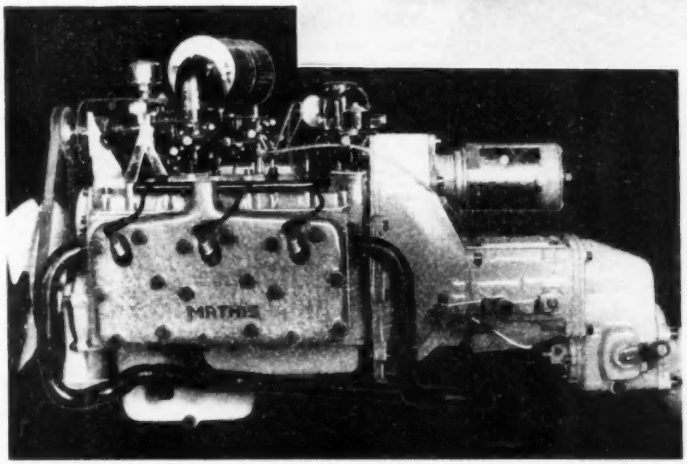


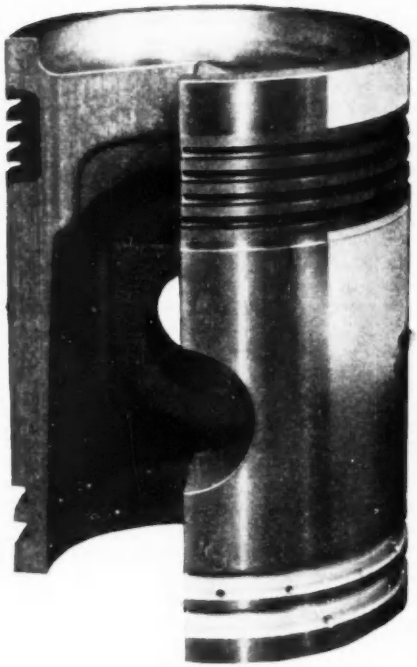
New front suspension designed for Mathis automobiles features this readily removable unit. Front and rear units are same except for the use of two coil springs in the rear suspension.



Developing 80 hp at 3800 rpm, this Mathis flat-six engine has a bore and stroke of 3½ in. by three in., and a compression ratio of seven to one. It has two downdraft carburetors and an unusual exhaust manifold arrangement. A two-speed gearbox mounted behind the three-speed transmission serves to lower the drive shaft as well as to provide a selection of six gear ratios.

How Alloy Iron Ring Lands Are Bonded to Aluminum Pistons

By Charles R. Coffey
Assistant Chief Engineer,
United Engine & Machine Co.



Two-stroke Diesel piston sectioned to show method of locating all compression ring grooves in bonded-in Ni-Resist iron ring.

THE unique combination of high mechanical strength, low density, low coefficient of friction, and high thermal conductivity as well as excellent casting and machining characteristics found in aluminum alloys present a material almost ideally suited for use in the manufacture of pistons. There are, however, certain applications where top ring groove wear in light alloy pistons has been a major problem.

This has been particularly true in the case of high performance two stroke Diesel engines where extremely high operating temperatures reduce the resistance to deformation of the aluminum in the vicinity of the top ring groove, thereby permitting this groove to enlarge under the repeated hammering of the ring. Distortion of the groove continues until it is enlarged to the point where it permits either functional or physical failure of the top ring to occur.

The obvious solution to this difficulty, and the one which would take advantage of the best features of the aluminum alloy piston while utilizing the resistance to wear at elevated temperatures which characterizes iron or steel pistons, is to produce an aluminum piston with an iron band to carry the top ring groove; or, if necessary, to carry all of the compression ring grooves. There have, in fact, been many attempts to produce just such a piston but none of these, however, has been chemically

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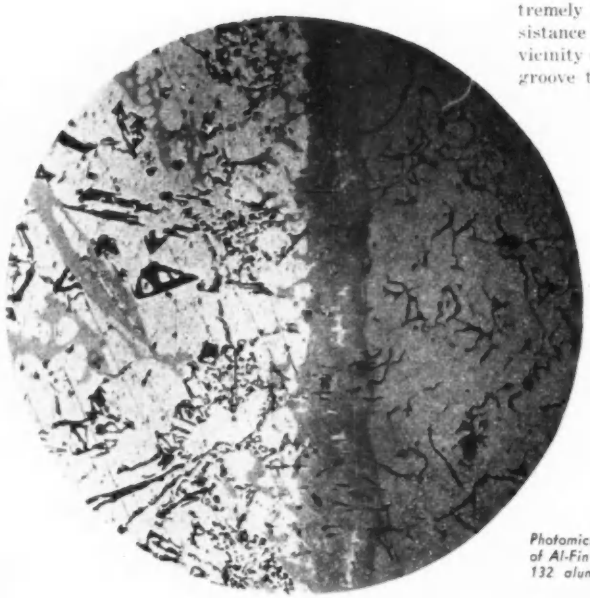


Photomicrograph at 250 magnification (nital etch) of Al-Fin intermetallic molecular bond between Alcoa 132 aluminum piston alloy (Lo-Ex) and Ni-Resist (austenitic iron) ring carrier.

By Joseph Geschelin

Improved Locking Differential

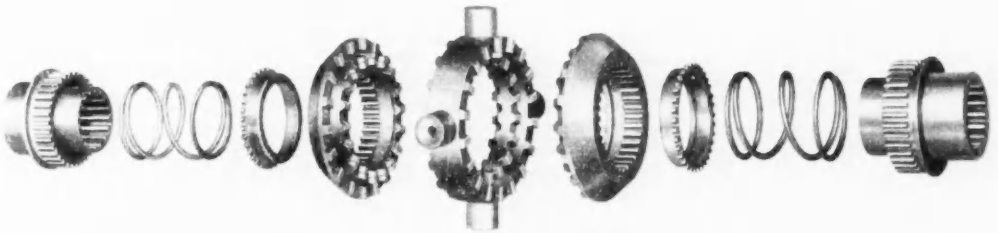
The split cam member is a feature of the latest version of the NoSPIN differential. When assembled it is snapped over the integral cam member of the driven clutch unit and is restrained from lateral movement by a grooved joint.

ACCORDING to information released by Detroit Automotive Products Corp., Detroit 13, Mich., successor to the Thornton Tandem Co., the latest version of the NoSPIN differential of the automatic locking type now in production incorporates important design and operating features impressed on the basic unit which has been employed extensively in recent years. The current model embodies special means said to reduce noise during intermittent operation and at the same time permit any variety of cycles of automatic locking and unlocking without undue wear, and free from frequency limiting effects of the spring mechanism.

The new differential is recommended by the manufacturer as an inter-differential on tandem axles and for transfer case applications.

The operating principle may be appreciated by studying the elements shown in the exploded view. The spider and center cam assembly consists of the spider, center cam and spider snap ring. As shown, the spider has four trunnions projecting radially from a center ring on each side of which are located fixed driving clutch teeth, the number of teeth depending on the size and model of differential. The internal diameter of the spider ring is uniform and contains the center cam. This cam is held in position with a centrally mounted snap ring which permits it to be rotated within the spider but does not permit lateral movement. The center cam is symmetrical, having the same number of cam lifts on each side as there are clutch teeth on the spider. The cam lifts have contours with uniform sloping elevation and rounded surfaces that provide ramps for disengaging the drive clutch members.

Two identical driven clutch members are located on each side of the spider and center cam assembly, each having a set of clutch teeth to match the clutch teeth on the spider for transmitting torque. Radially inward from the driven clutch teeth and rigidly attached to the driven clutch is a member with cams to mesh with the center cam member. The new "quiet" drive feature of the current design incorporates the

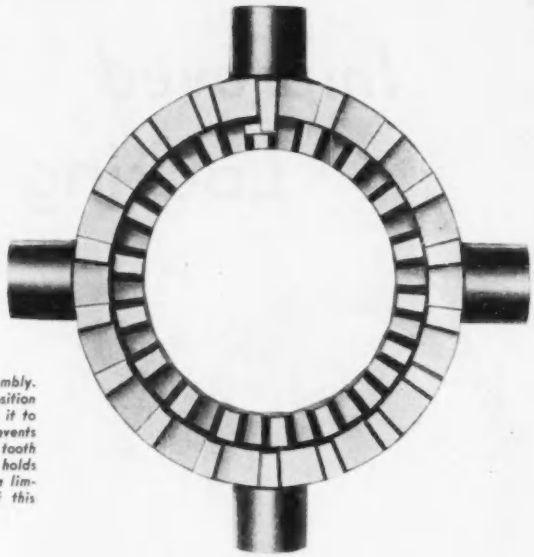


Exploded view of NoSPIN differential.

addition of another cam member which is split with a wide joint so as to permit snapping it over the integral cam member. It is restrained from lateral movement by means of a grooved joint but is free to move peripherally.

One of the clutch teeth on the spider is machined longer than the rest to serve as a key fitting into the open joint space in the movable cam member. This key serves to hold the cam member and permits a definite amount of peripheral movement backward and forward.

Spring retainers are inserted into the outer ends of the driven clutch members, the springs being held in the retainers. The two splined members receive the axle shafts, the inner hubs being inserted in the outer ends of the springs. At the same time the external splines engage the internal splines of driven clutch members.



Spider and center cam assembly. The center cam is held in position by a snap ring which permits it to rotate in the spider but prevents lateral motion. Note the long tooth at the top of the spider which holds the center cam but permits a limited amount of rotations of this member.

For straight forward drive the clutch teeth on both sides are fully engaged and similarly the two sets of cam rings of the driven clutch members are fully meshed with the center cam; the movable cam member, described earlier, being in mesh with the projecting key on the spider at all times.

Engagement of driving and driven clutch teeth is assured by the pressure of the two springs which force the driven clutch members inwardly against the spider and also by the positive locking action developed by the mating undercuts on the driving faces of the clutch teeth. Thus both clutches remain fully engaged and the assembly operates as a solid unit, each rear wheel being driven forward at ring gear speed.

Similar conditions prevail for rearward drive except that the spider rotates in reverse direction and shifts driving force to the opposite faces of driving clutch teeth.

When making a turn the NoSPIN differential will allow either wheel to turn faster than ring gear speed, but it does not permit either wheel to turn slower than ring gear speed when power is applied.

In executing this maneuver, the driven clutch for the outside wheel becomes disengaged and permits the wheel to travel faster than the spider. Considering that in a right turn the right hand side remains in full engagement, thus locking the center cam in fixed position, it may be seen that the cams on the left side of the center cam serve as ramps upon which the left hand driven clutch member can rise to complete the disengagement. At the same time the clutch teeth on the driven member also disengage and rotate freely without contacting the mating teeth on the spider.

At the instant such changes occur the movable cam ring of the driven clutch member on the left side is displaced angularly by contact with the key on the spider, sufficiently to be out of phase with the cam teeth of the fixed member. This prevents the driven clutch member from remeshing because of spring action. Remeshing can occur only through reversal of torque, which changes the relationship between the spider key and the movable cam ring, returning the cams on the movable cam ring to a position of alignment with the cams on the clutch member. This enables both sets of cam teeth to line up properly for meshing with the center cam and allows the teeth on the driven clutch member to return to full engagement.

A wheel on ice or mud may have so little traction that the other wheel must be relied upon to propel the vehicle. Under such conditions the NoSPIN differential forces both wheels to rotate at ring gear speed.

When traversing rough or uneven terrain the differential will permit intermittent action as required and will go through phases of locking and unlocking in rapid succession.

Fordability Requirements for Future Tactical Vehicles

The Army has recently issued special regulations which define and establish the general policy relative to the fordability requirements of future tactical vehicles. Fords are defined by the Army as shallow or deep. Shallow fording is defined as the ability of a vehicle with its suspension in contact with the ground, equipped with built-in waterproofing, to negotiate a water obstacle without the use of special waterproofing kits. Deep fording is defined as the ability of a vehicle with its suspension in contact with the ground, equipped with built-in waterproofing, to negotiate a water obstacle by application of a special waterproofing kit which may be installed.

Large Dust Tunnel Tests All Types of Vehicles

A NEW dust tunnel which is the first of its kind large enough to provide for buses and trucks was recently completed by Fram Corp. at Dexter, Mich. The test chamber is built of glass and aluminum and is designed to provide dust conditions of all types.

From the control room, engineers have an unobstructed view of the vehicle under test, and through instruments and remote controls they can keep close check on engine performance as well as prepare and analyze the dust mixtures.

Power for the blower, which circulates the dusty air, comes from the engine of the test vehicle through the two rolls under its rear wheels. Three different pulley ratios are available to adjust the speed of the blower to the engine speed and horsepower. Dust is introduced into the tunnel through a tube which goes to the center of the blower. There the dust is dispersed in the air stream and circulated through a series of curved baffles which are directed to envelop the vehicle.

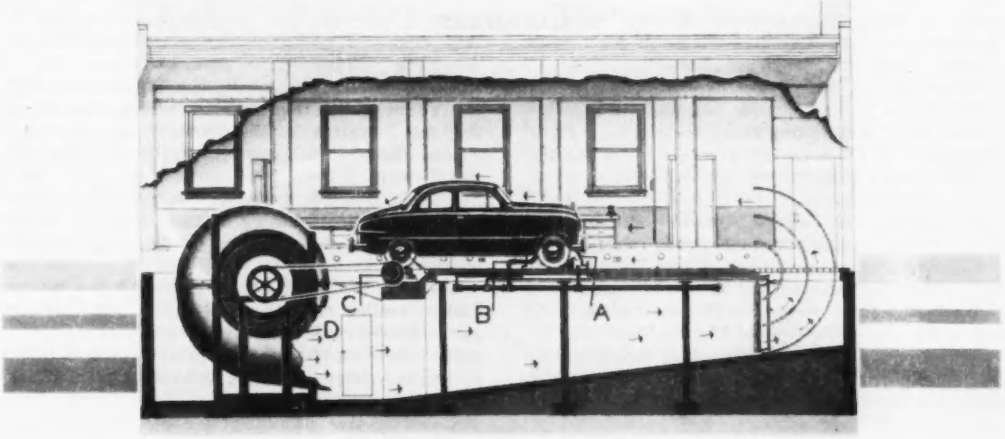
A sampling device is installed ahead of the car so that a continuously measured quantity of dusty air can be drawn through an absolute filter to check dust concentration.

To test a car, the vehicle is backed into the tunnel where its rear wheels drop between the long rolls. Chains are attached over the rear axle to hold the wheels in contact with both rolls. The engine's radiator is disconnected and hoses are run from the tunnel's water supply to the engine's cooling system, so that the engine's water pump is still used to circulate the water. In order to cool the exhaust, the vehicle's exhaust system is disconnected and cold water is injected into the hot gases as they leave the engine manifold. The cooled gases and water are then passed through a water trap where the gases are pumped out of the building and the water flows to the sewer.

Ignition, clutch, and throttle are controlled remotely from the panel in the control room. Before and after each test, filters used on the test car are weighed and checked; and samples of transmission, rear axle, and crankcase oil are taken for examination and comparison. During tests a log is kept of mileage and all instrument readings. After completion of the tests, the

(*Turn to page* 90, *please*)

Diagram shows operation of the new FRAM dust tunnel. Vehicle radiator is disconnected and replaced by tunnel water supply (A) to prevent rise in air temperature. Exhaust and cooling water are carried away through system (B). Rear wheels rotate rollers (C) which drive blower (D). Measured dust enters through blower and follows air stream indicated by arrows.



Metal Show Most

Variety of New Developments at 31st National Metal Exposition and Congress

With 362 exhibits and an attendance record of close to 69,000 the 31st National Metal Congress and Exhibition held in Cleveland last month was the largest ever. More than $8 million worth of equipment was displayed in over 220,000 sq ft of floor space in Cleveland's Public Auditorium. All of the exhibits, whether large or small, had their share of interested visitors. Nearly all displayed something to aid in saving time or material—either of which means economy in production. Naturally many of the most important machines, instruments, materials, etc., at the show were not new developments but this did not detract from interest in them.

Among the new developments shown was a portable, low-priced, oxyacetylene shape-cutting machine, the Airco No. 3 Monograph which was demonstrated at Air Reduction Sales Company's booth. In addition, Air Reduction demonstrated the Aircomatic gun in new design for welding stainless steel, a new use for this device which was introduced last year to weld aluminum.

Allis-Chalmers Mfg. Co. had in operation a dielectric sand core dryer known as the Foundromatic which speeds core room and moulding floor operations.

Display for the first time was a 15-in. Continuous Wheelabrator Tumblast which was in operation at the exhibit of American Wheelabrator & Equipment Corp. It eliminates stopping for loading or unloading.

Savings in paint, solvents, air, and labor were claimed for a paint heating device made by Bede Products, Inc. With the hot spray process paints are heated to a fairly high temperature—between 160 and 200 F—just before spraying.

The DoALL Co. demonstrated its new Contourmatic, a fully-automatic contour sawing machine with a stepless variable speed range of from 40 to 10,000 fpm for use on practically any industrial material.

A new line of a-c welders in various sizes and ratings was shown at the General Electric booth.

Hammond Machinery Builders, Inc., had in operation a Model K rotary automatic polishing and buffing machine. Its indexing time, regardles of dwell time, is one second.

E. F. Houghton & Co. displayed a new revised line of rust preventives which meet practically all needs for prevention of rust either indoors or out; and a new salt for precious metal heat treatment.

Kennametal K138 was shown under test at high temperatures with heavy loads at the exhibit of Kennametal, Inc. This composition has a transverse rupture strength of 100,000 psi at 1800 F. Among its possible applications are valve seats, for internal combustion engines, and parts such as blades for jet engines.

A 10 kw high-frequency heating unit was shown in operation by Lindberg Engineering Co. This was a new development for Lindberg, well known as a maker of furnaces.

An argon-shielded, mechanized metal-arc welding process was demonstrated by Linde Air Products Co. Using this new technique, welds were made in ½-in. aluminum plate at a speed of six in. per minute.

Many parts made by the Marform metal forming process were on view at the Glenn L. Martin Company's booth. This new process for forming sheet metal employs a male die only.

High-Frequency TOCCO motor-generator sets and heating stations, both of vertical design, were the new products shown by the Ohio Crankshaft Co. They occupy less floor space than other TOCCO equipment of conventional design.

The Udylite Corp. has a large automatic chromium plating machine arranged for demonstration without actually applying any chrome plate. It is a new type which eliminates the use of chains.

A Model B-20 DL, newest unit in the line of manually-operated liquid honing cabinets made by Vapor Blast Mfg. Co., was displayed together with samples of its work.

Westinghouse Electric Corp. featured a new r-f induction heating machine which will be made in four semi-standard models as well as in special models to order. Other new Westinghouse products were welders, automatic welding heads, and an electronic control for resistance welding.

Keynoting the technical program of the 31st Na-

Successful Ever Held

tional Metal Congress was the theme of "Economy-in-Production" covered in the form of a series of ASM panel discussions held twice daily during the week. The same theme was carried out by means of "Economy Theaters"—a showing of educational films by some 24 exhibitors.

The technical program was literally packed with activity in every direction designed to tax available time to the very limit. Each of the participating societies—American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers (AIME), and the Society for Non-Destructive Testing (SNDT) held a full program of technical sessions. In addition, ASM had a seminar on thermodynamics of physical metallurgy, and a series of educational lectures on machining — theory and practice; and stress-corrosion in metals. Similarly AWS has its own educational lecture series interspersed with the technical program.

"Economy in-Production" panels covered the gamut of subjects listed here: Cleaning and finishing; press shop operations; welding techniques; heat treatment operations; tailor-made alloys and mill products; more precise casting or formed shapes; metallurgy in machine shop operations; and brazing, soldering and welding. Generally speaking the panels were designed, not for audience participation, but for a presentation of new ideas and new developments by the panel members. The material in each case was rehearsed in advance together with questions and discussion on the part of other members of the panel.

Of major interest to production men was the group of educational lectures on the theory and practice in machining. Among the subjects covered were: "Metal Cutting Research" by M. E. Merchant; "Cutting Fluid Theory" by Milton Shaw; "Cemented Carbide Tool Materials" by J. C. Redmond; "Heat in Metal Cutting" by A. O. Schmidt; "Evaluation of Machinability" by Field and Zlatin; "Materials and Machinability" by F. W. Boulger; "Metallurgy and Machinability of Steels" by J. D. Armour; "Tool Steels" by G. A. Roberts; "Tool Life Testing" by Prof. O. W. Boston; "Some Metallurgical Aspects of Grinding" by L. P. Tarasov; "Economics of Machining" by Prof. W. W. Gilbert; "Development of the Macrostructure of Metals by Machining" by Clarebrough and Ogilvie of the University of Melbourne.

Among the many topics covered by action film in the economy theaters were: "This is Aluminum" presented by Alcoa; Cincinnati Milling—"Highway to Production"; "The Versatile Contour Saw" by DoAll; "Designing Machinery for Arc Welding" by Lincoln Electric; "Die Casting" by New Jersey Zinc; Towmotor's "One Man Gang"; "Induction Heating for Forgings" by Tocco; and topics by Westinghouse, General Electric, Tinnerman and others.

The application of an inert gas atmosphere for arc and gas welding was given considerable attention at sessions of the American Welding Society. In a paper entitled "Heliarc Welding in the Automotive Industry" by Pilia and Bennewitz of the Linde Air Products Co., the authors indicate that Heliarc welding has been applied successfully to the welding of such parts as bumpers, fenders, and body sections. In the case of body sections it is claimed that Heliarc welding permits simplification of deep drawing operations by breaking

down parts into multiple assemblies which can be readily welded and finished to proper contours. Tangible savings are said to include reduction in scrap, simplified dies, reduced press operation, elimination of solder, and reduced finishing costs.

M. J. Conway, General Electric Co., discussed the "Application for Helium in Inert-Arc Welding"; while Muller, Gibson, and Roper of Air Reduction Sales covered the development of the Aircomatic process for welding aluminum alloys, stainless steels, and magnesium alloys in a paper titled "The Inert Gas Shielded Metal Arc Welding Process."

Incidentally, at the welding panel mention was made of an entirely new technique in inert gas welding—the arc-spot welder. For this purpose they use the tungsten arc welding unit, which is held stationary, while the work is moved progressively through the welding head.

Following are abstracts of some of the papers presented during the technical sessions.

New Criteria for Predicting the Press Performance of Deep Drawing Sheets

By W. T. Lankford, S. C. Snyder, and J. A. Bauscher,
Carnegie-Illinois Steel Corp.

THIS investigation, based on the great need for a better understanding of the basic properties which are essential for optimum press performance in deep drawing sheets, was to determine whether isotropic or anisotropic material is best suited for unsymmetrical formations. This situation is of particular concern in connection with very severe forming operations, such as automobile fender draws which were used for this investigation.

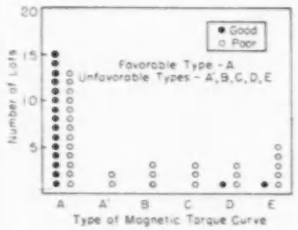


Fig. 1—Distribution of types of magnetic torque curves for all lots tested.

The materials studied in this investigation include samples from 46 lots of fully-aluminum-killed, low carbon, deep drawing sheets which exhibited wide variations in drawing performance in the plants of several producers of deep drawn parts.

Magnetic torque curves were obtained for all of the 46 lots of known drawing performance. An examination of Fig. 1, in which the distribution of the various types of torque curves is plotted, reveals that 15 out of 17 good lots are characterized by type A curves. However, it is also apparent from Fig. 1 that the performance of all the poor lots cannot be accounted for on the basis of unfavorable types of torque curves alone. This same observation is true when the R_L values (ratio of width strain to thickness strain) are plotted, as shown in Fig. 2. When the torque curves were compared to corresponding R_L values, it is found that a high degree of correlation exists,

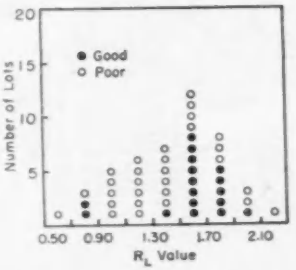


Fig. 2—Distribution of R_L values for all lots tested.

Fig. 3. As can be seen in the chart, lots exhibiting favorable magnetic torque characteristics also exhibited high R_L values, whereas those lots having unfavorable magnetic torque characteristics exhibited low R_L values, with but two exceptions.

As the present investigation proceeded, it became evident that the prevalent ideas regarding the desirability of using isotropic material in all types of deep drawing operations should be modified. Although it is still believed that as isotropic material is best suited for symmetrical forming operations, it has been demonstrated that material having a considerable degree of plastic anisotropy of a favorable nature results in the best press performance in the particular unsymmetrical formations studied in this investigation. On the other hand, it has been shown that material having a minimum of plastic anisotropy results in very poor press performance in these same unsymmetrical formations.

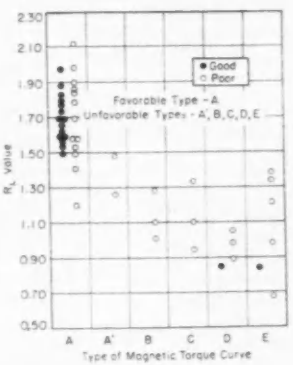


Fig. 3—Qualitative correlation between R_L value and type of magnetic torque curve for all lots tested.

This plastic anisotropy has been found to be associated with preferred crystallographic orientations by correlating R_L values with magnetic torque characteristics, the latter being known to reflect preferred orientations.

Effects of Quenching Rate and Quench-Aging on the Tensile Properties of Aluminum Alloy 61S

By R. C. Lemon and H. Y. Hunsicker,
Aluminum Co. of America

THE mechanical properties developed in alloy 61S by a procedure of quenching from the solution temperature in a molten salt bath maintained at temperatures of 320, 360, or 400 F (160, 182, or 205 C) and continuing the aging in the bath were compared with those produced by quenching in water at 70 F or boiling water followed by reheating to the same aging temperatures. When the tensile properties obtained by the two procedures were correlated on the basis of the cooling rates prevailing during quenching, Fig. 4, no specific improvement in either the rate or magnitude of the hardening effect could be attributed to the quench-aging procedure. Moreover, the optimum properties achieved by quench-aging were lower than those produced by quenching in cold water followed by immediate aging at elevated temperatures. The lower cool-

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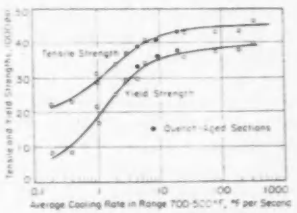

Fig. 4—The effect of cooling rate on the tensile properties of aluminum alloy 61S. Samples were aged six hours at 360 F immediately after quenching from 970 F into various media.

Laminated Hardwood Parts for Station Wagon Bodies

THE Ford Motor Co. is employing a special technique for the production of door, quarter panel, window and tail gate frames for station wagon bodies. Thin wood plies are used for these parts instead of large billets of hardwood, resulting in a saving of both material and labor.

Dielectric heating plays a large part in the making of the laminated wood parts. It eliminates the need for many different curved pieces which would be required for hot presses as well as the variable heating cycle which would depend upon thickness of the workpiece. Because of its speed, less floor space and fewer jigs are required.

Joints to be glued are spread with penetrating phenolic resin and allowed to air dry. They are then respread with a viscous coat of resin, placed in position in an assembly jig, and pressure is applied in a press between two electrodes connected to a high frequency generator. The electric current is turned on for a few minutes after which the press is opened and the frame removed. Copper and aluminum shields prevent radiation of high frequency energy while the press is in operation.

Pressures are approximately 300 psi and voltages may be as high as 3000 to 4000. Eighteen presses of 75 tons capacity are used at Ford's plant in Iron Mountain, Mich.

Parts made by the lamination process not only require about 33 per cent less wood, but are less likely to warp when in use.

A method to use phenolic resin for bonding the quarter and door frames to their plywood has been developed for future production at Ford. When in operation, the new method will eliminate the much more costly process of drilling and using wood screws. Solution of the problem required compatibility of the plywood finish and the adhesive, and the design of a proper jig and electrode system.

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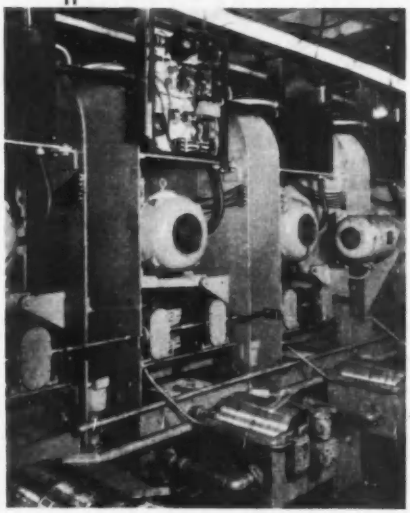
Here are two of the 18 presses in use at the Ford Division in Iron Mountain, Mich., for bonding of wood plies.

How Pontiac Prefinishes

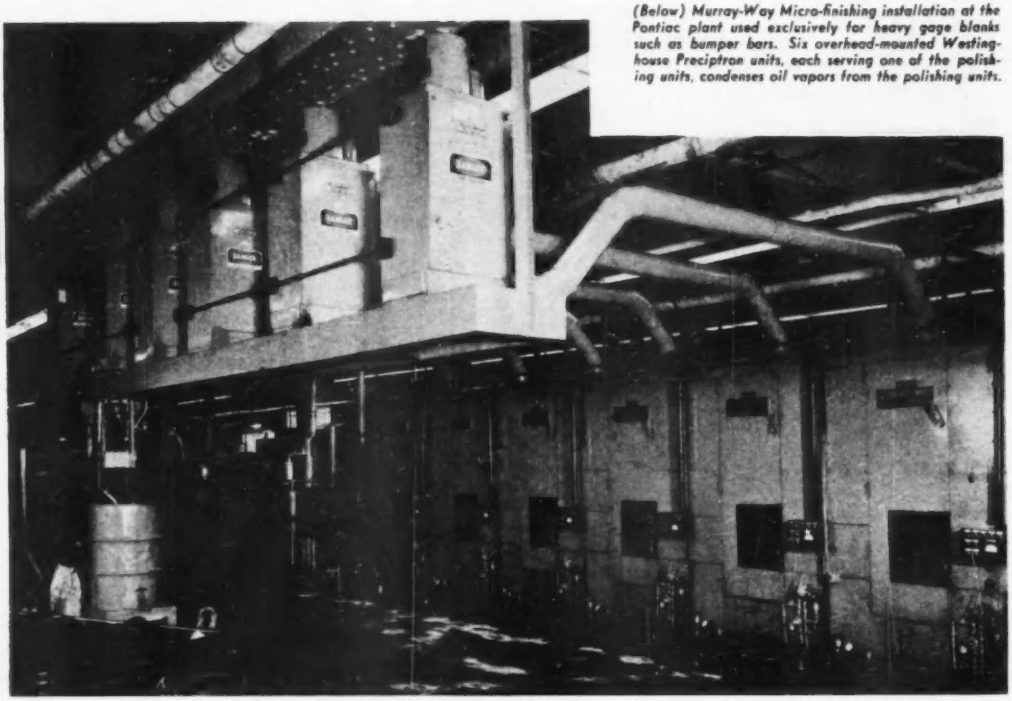


FLAT polishing, as the process is termed, is a continuous and automatic operation where a pressed steel part to be electroplated first goes to a Murray-Way Micro-Polish machine in flat blanks. These blanks are polished, washed, and coated with a special water-soluble film. The coated blanks then are formed in press dies in the usual manner, but due to the coating they are free of scratches or other surface defects when removed, thereby eliminating hand and machine polishing prior to electroplating. The coating is removed in the cleaning tank of the electroplating unit.

This process was described in AUTOMOTIVE INDUSTRIES, Sept. 15, 1949, and now two illustrations taken at the Pontiac Motor (Div., General Motors Corp.) are presented

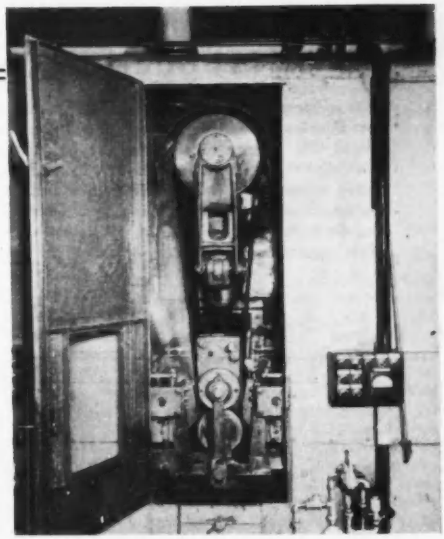
(Left) This rear view of the Murray-Way Micro-Polish machines shows the motors and various accessories. A Barnesdril magnetic separator is installed at each head for the removal of abrasive material from the petroleum oil coolant.

(Below) Murray-Way Micro-finishing installation at the Pontiac plant used exclusively for heavy gage blanks such as bumper bars. Six overhead-mounted Westinghouse Precipitron units, each serving one of the polishing units, condenses oil vapors from the polishing units.



Bumper Bars

which will supplement the information in that issue. In addition to bumper bars, Pontiac also employs this procedure for radiator grille sections and other plated parts.



An open door at the front of a station of the polishing machine reveals the abrasive-covered fabric polishing belt running on a large overhead pulley and a small pulley directly below. This belt is oscillated while running in order to maintain the proper alignment, give longer belt life, and to produce a finish that is free of line patterns. The steel blanks are drawn between the polishing belt on the small pulley and the idler under it. Upon leaving the machine, the steel blank receives a water soluble coating that protects it when formed or handled.

Fuller Torque Divider

ANNOUNCEMENT is made by the Fuller Mfg. Co., Kalamazoo, Mich., of the development of its PD-45-H torque divider for use in combination with tandem rear axle drives having hypoid gear sets. One feature of this unit is the provision of two output shafts which rotate in the same direction as the input shaft.

Engine rotation of the two output shafts is accomplished by connecting the front propeller shaft to the countershaft of the two-speed transmission which is mounted on the front end of the torque divider case. Since the mainshaft delivers power into the torque divider, the effect of turning the countershaft, instead of the input drive gear with engine rotation, is to turn the input to the torque divider opposite to engine rotation. This rotation is reversed by the gears on each output shaft which mate with a gear on the input shaft of the divider, the result being engine rotation of output shafts.

Another feature of this design is that both output shafts are on the centerline of the chassis, one above the other. This will facilitate propeller shaft installations in many cases.

The two-speed transmission has ratios of .903 to 1 and 1.857 to 1. These, combined with the internal

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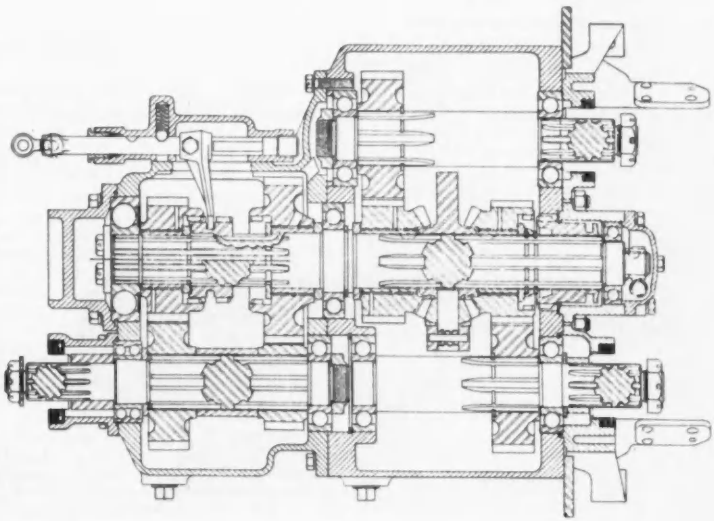


Longitudinal section of the Fuller PD-45-H torque divider and two-speed transmission.

Production Coordination

"The automobile industry of this country represents the best example of high caliber coordination. The basic concept of all engineering designs is the production that might follow. The automobile industry, having achieved a high standard of mechanization, can assist the aeronautical industry in applying this know-how to the proposed use of heavy equipment. This contribution would be principally in the field of mechanizing the operations required for feeding the presses, handling and transporting material to and from the dies, die setup, conveyor heat treating furnaces, pickling baths, and other operations peculiar to this type of manufacture."

Lt. Gen. K. B. Wolfe
Deputy Chief of Staff for Materiel
United States Air Force

Basic Problems of Aircraft Producibility

Factors Which Enter Into Plane and Engine Production Discussed at SAE National Aeronautical Meeting

by R. Raymond Kay

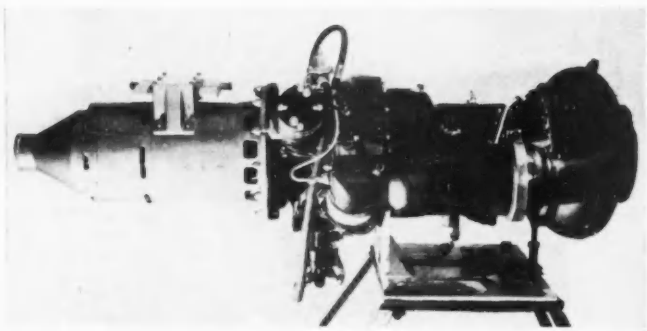
PRODUCIBILITY — its related problems from the viewpoints of airframe manufacturers, engine manufacturers and the military services — was the main theme of the SAE National Aeronautic Meeting held recently in Los Angeles. The multiplicity of factors which enter into plane and engine production from design-manufacture-organization to the finished product had a thorough hearing. Many of the methods discussed were described as suitable for peacetime operations of industry, but major attention was centered on requirements of industrial mobilization for war.

Best Postwar Meeting

The timeliness of the subjects and the high caliber of the men who read papers were certainly responsible for the large attendance—the best postwar SAE meeting held on the Pacific Coast. Much credit for the success of the meeting should go to the general chairman, Charles F. Thomas, and to D. R. Shoults, general chairman of the four producibility panels.

Blending the pertinent factors relating to aircraft design and manufacture into a satisfactory end product is a difficult problem. The variety of opinions and viewpoints expressed demonstrated to this writer that both the authors of the papers and the participants in the

(*Turn to page* 106, *please*)



One of the auxiliary gas turbine power plants shown by AiResearch Manufacturing Co. It is directly coupled to an 800 amp. 24 volt dc generator.

AIRBRIEFS

By ROBERT McLARREN

Jet Fever

After a tumultuous chorus of "So what?" thrown at the British jet airliners (D.H. Comet, Avro C-102), the U. S. aircraft industry scampered back inside its plants and set busily to work on detailing, tool designing and mock-up building on their jet airliners. Literally "everybody's doin' it!" and the race to be first hasn't been matched by anything since 1945 when the industry turned to twin-engined postwar transport building. Two companies are attempting to sneak in the back way by quick modifications to existing airplanes for turboprop power. Convair is well along on its modification of a standard Convair Liner to take Allison turboprop engines and Glenn L. Martin is completing plans for a turboprop version of the 2-0-2 airliner. But the remainder of the industry has its eyes solely on the pure jet airliner. Boeing is readying a passenger version of its successful XB-47 Air Force bomber with double-engine nacelles at the tips and huge fuel tanks suspended from the swept wing near the fuselage. Lockheed has a four-jet model not unlike the famed "Connie." Douglas is wrestling with a jet-pod version of the DC-6 on the one hand (a minimum of new tooling required) and an all-new, super-sleek but frightingly expensive model (an estimated $22 million) on the other.

Show Me

Witnessing this feverish activity with a slightly-amused but half-serious eye are the U. S. scheduled airlines, whose "We don't want 'em—the British can have them!" attitude 30 days ago has quickly changed into a "Well, let's see what you've got!" reaction. There now appears one certainty: U. S. airlines will *not* buy any British jet airliners, or any other kind of airliners, for that matter. If any are purchased they will be the homegrown variety and this positive "Buy American" policy has hastened even conservative aircraft manufacturers to take the plunge. No one, at this point, is even guessing where the money is coming from but this no longer comprises a serious barrier to jet transport progress. Congressional adjournment without action on the "Prototype Bill" cast the final die in favor of going ahead with company reserves, sinking funds, borrowings, wherever cash or credit can be obtained. The airline attitude follows the same optimistic course, aided and abetted, however, by a general loosening of credit in the face of rising profits.

The Public Will Pay

Most thoughtful analysts point out the huge airline investments in current equipment as the major stumbling block in the path of a really rapid transition of U. S. airlines to jets. Some airlines are only now receiving their Boeing Stratocruiser transports, others are awaiting deliveries on brand-new Lockheed Constellations and Douglas DC-6's. The Convair Liner is still going out to U. S. airlines. If a return is to be shown on these truly substantial capital investments, these airplanes must be operated for at least five years and some think ten. But much airline thinking about the jet transport centers about the now-historic concept of an initially premium service augmenting the rapidly-spreading sky coach service. In this way the traveling public can (and will readily) pay the bill for the new jet airliners, which sounds quite reasonable at least to this observer. But, like gold and uranium, the bug has bitten deeply and left its fever and there is room for doubt there will be much serious thinking about the practicability of jet transportation for at least the next two years, while the temperature rises to the boiling point until the first U. S. airline announces: "It's here —tomorrow's jet transport now!"

American Gives In

America's two biggest domestic airlines — American and United — have stood firm through the postwar years as the fortress of the theory that air travel is a luxury service and have resisted the industry-wide shift to the "sky coach" concept. Mighty American, the nation's largest domestic airline, has finally announced 4½-cents-a-mile transcontinental sky coach service beginning Dec. 27. This leaves only W. A. Patterson, United Air Lines' president, as the holdout against such service and he is already revealing a "maybe" attitude. Most observers predict that UAL will take the plunge early next year. Such a move will mark the end of an era in which only the rich could fly and boast of it. But it will also mean the end of the luxury of air travel, its privacy, its elaborate individual services, its great comforts. Starts now the vague beginnings of the "sky subway train" with its speed and convenience. However, ever-increasing cruising speeds reduce the time aloft to a question of only a few hours so that comfort is rapidly losing its demand, privacy its reward.

48-Group Harry

It's a little difficult to understand how President Truman, whose forte is accurately interpreting the will of the people, could have denied them their demand for a 58-Group Air Force program for fiscal 1950. Voted overwhelmingly (305 to 1) by the House, agreed to by the Senate, it is apparent that the 58-Group program stood approved by the elected representatives of the American people. Yet Truman decided that the Congress had incorrectly identified the tune and forthwith set aside $615 million in procurement funds for new aircraft. Thus, not only had the Air Force procurement program been stalled for nearly four long months but, at the last minute, much of it has to be scrapped. Truman announced something about this amount of money resulting in "a serious lack of balance in our defense program," "too great a strain" on the nation's domestic economy, and similar mumbo-jumbo but it all added up to the fact that he personally wanted only 48-Groups in the Air Force and is determined to hold it there, against the same military advice he has praised so highly in other matters. This suspected but unexpected move has thrown Air Force procurement plans into another cycle of scrapping, reworking, ordering and cancelling that is certain to cost the taxpayers $615 million over the period 1947-52 during which we were supposed to be carefully building a 70-Group Air Force on a long-range, economical procurement program. With Naval Aviation procurement a thing of the past, this new slash brings the aircraft industry back down hard where it was in 1946. We're no strategic military planner but it's a little hard to understand why this nation can afford to ship a billion dollars' worth of rifles to Western Europe to fight off the Russian atom bomb but it can't afford 2/3 that amount for modern fighters and bombers!

CAA Sandbagging

The Civil Aeronautics Administration embraced the "cross-wind" landing gear as a panacea for aviation ills about three years ago and has spared little expense in developing this gadget for aircraft ranging in size from two-place lightplanes to a Douglas DC-3. Industry lethargy in its adoption only brought forth greater CAA zeal until the other day the CAA announced that henceforth it would approve Govern-

ment funds for only one runway on any Class I (small) airport and for more than one runway on larger airports provided the runways do not intersect! This, in our humble opinion, is one of the neatest pieces of sandbagging in modern CAA history for it does all but threaten the U. S. aircraft industry to switch to the cross-wind gear or else! By striking directly at the airport, the CAA sees correctly that it is striking directly at the kinds of airplanes that will be built. The CAA argument in support of this measure makes absolute sense *provided* you accept their premise that the cross-wind gear is as inevitable as was the monoplane. This gear permits an airplane to land with its fuselage skewd to the direction of its motion, its swiveling main gear pointing directly down the runway while the airplane is nosed into the wind. But critics point out that its success to date has been on tractor landing gears and that a Constellation pilot would have a lot of fun bringing in his 107,000-lb airplane at about 100 mph on free-swiveling nose and main gear wheels! The gear has been tried on a 1400-lb tricycle-geared, spin-proof Ercoupe but on nothing larger.

Permanent Fixture

The jettisonable auxiliary fuel tank has become almost a hallmark of the jet fighter, an application carried over from the escort-fighter days of World War II, although the idea goes back to World War I. Both wind tunnel and flight tests, however, have shown that tip-mounting of these tanks not only adds no drag but actually reduces the drag of the airplane by the familiar "end-plate" effect. Thus, jet fighters so-equipped are faster and can fly farther. A few months ago Grumman engineers reasoned: "Why drop them, then?" and forthwith installed permanent tip-tanks on their F9F Panther fighter. McDonnell engineers have done the same thing on their new F2H-2 Banshee. Such permanent installations are easier and lighter to build and can be made much stronger. Fuel can be jettisoned in emergency by special dump valves in the aft end of the tanks. Now the Air Force is investigating the idea for its new Lockheed F-90 penetration fighter. So it would appear that what was once only a temporary "fix" to the problem of fighter range has now become a permanent equipment whose excresence belies its aerodynamic merits.

"Class" Air Travel Looming

One of the basic characteristics of routine U. S. air travel has been its "one-class" service: everybody paid the same fare, everybody rode in the same first class accommodations. But the bumptious "nonskeds" changed all that, shortly after the war, with their cut rate service. To meet this competition, many of the certificated trunk lines instituted "sky coach" service, but installing more but less-comfortable seats, dispensing with meals aloft and other frills. This service has split the airline industry into two philosophic (and economic) camps with United Air Lines and American Air Lines holding tenaciously to the theme that air travel is, and must remain, a luxury service. Other airlines have adopted the theme that air travel is essentially a sky-going bus service, and have established a portion of their operations on that basis. Now comes Northwest Airlines with the next step in the process: a three class service. NWA offers "first class" air travel in its big, new Boeing "Stratocruiser" transports at 6.1 cents a mile; "second class" service in its Martin 2-0-2 transports and Douglas DC-4 four-engined craft at 5.1 cents a mile; and a "third class" fare of 4.1 cents a mile in its Douglas DC-4 planes equipped as "sky coach" carriers. At the moment the idea is wholly experimental. Psychologically the passenger may avoid the first class service when he can travel "just as good" in the 2-0-2 for less money. By the same token he may avoid the "third class" ticket because of its implications of inferiority. But NWA will solve this problem by scheduling the three type services in such a manner that the passenger has little if any choice. For example, he will not be able to fly non-stop from New York to Minneapolis by "sky coach" nor to fly from Washington to Pittsburgh in a Stratocruiser. But in many segments there will be a definite passenger choice of accommodations and this the industry will watch closely.

OBSERVATIONS

By JOSEPH GESCHELIN

Silicone Rubbers

Unobtrusively to be sure, silicone rubber formulations are being placed in commercial production by several manufacturers. These materials are being grooved for applications in the mechanism of motor vehicles and engines wherever their special properties justify adoption. Among other things, the silicone rubbers can withstand high temperatures, extremes of temperature, and the attack of many corrosive fluids. Dimensional stability under these operating conditions is one of the principal attributes.

Colored Rubber

One of the important producers of mechanical rubber goods has developed a new technique for producing rubber in a variety of colors. They feel this process should be of more than passing interest for motor cars since exterior moldings and interior trim items could be colored to match or harmonize with the special color treatment of the car.

Powder Metal

The National Metal Exposition held in Cleveland recently indicated a tremendous activity on the part of manufacturers of powdered metal parts. Talking to a specialist in this field, we learned of some experimental work under way to produce engine timing gears from powdered iron. The objective is to fill the voids in the porous metal with a suitable deadening material designed to reduce noise and vibration.

Fat Tires

Many car owners have experienced certain difficulties with the low pressure tires introduced within the last couple of years. While these problems have not been given publicity, it is of interest that some motor car producers are specifying slightly higher inflation pressures for 1950. Too, one of the manufacturers plans to adopt a new 8.00-15 size to replace the former 8.20-15.

Hot Oil

Hottest development in current heat treatment procedures is the quenching of parts in hot oil with violent agitation of the liquid. Under proper control this treatment develops a martensitic structure and yields some amazing advantages. For example, one large manufacturer using this procedure reports complete freedom from fire distortion without resort to quenching dies. Another point of major importance is the ability to substitute lower priced grades of steel for highly stressed parts without loss in physical properties.

Total Vehicles in U. S. Nearly 44 Million

1949 Forecast Indicates 43,429,205 Registered Cars, Trucks and Buses

By Marcus Ainsworth

FOR the fifth consecutive year motor vehicle registrations will show a decided increase over the preceeding year with 1949 indicating a gain of 7.3 per cent or 2,951,000 units over those of 1948. For all of the other years, the increment amounted to 513,000 in 1945, 3,269,000 for 1946, 3,543,000 for 1947 and 3,241,500 for 1948.

These continued increases during the past five years will have brought total registrations of motor vehicles up to about 43,429,205 by the end of the 1949 registration year. Of these vehicles, 35,555,832 will be passenger cars and 7,873,373 trucks and buses. Passenger cars will record a 7.7 per cent gain and trucks and buses 5.4 per cent. In addition to the 43,429,205 registered vehicles there are those cars, trucks and buses owned by federal, state and local governments which are unregistered. While no data are available as to the number of these vehicles at the present time, we do know that at the end of 1948 there were 529,000 of them, and it is safe to assume that at least as many will be recorded by the end of 1949. The grand total of registered and unregistered vehicles will therefore be just shy of 44 million or 43,958,267.

All of the data shown above are the result of the annual survey conducted by AUTOMOTIVE INDUSTRIES for the purpose of making as accurate a forecast of motor vehicle registrations as possible. Final and complete figures will not be available until the publication of the 1950 Statistical Issue of AUTOMOTIVE INDUSTRIES, off press on March 15. Forty-four states and the District of Columbia cooperated with us in furnishing their latest available data and in addition giving us their estimate for the remaining period of their registration year. Past experience with these annual surveys has shown the forecast to be within a very close percentage of final figures and it is believed that this 1949 forecast will follow that same trend.

Twelve states will have over one million registrations each. California will be in the number one position with 3,928,062 registrations, New York second with 3,322,750, Pennsylvania third reg-

(*Turn to page 67, please*)

Forecast of 1949 Motor Vehicle Registrations

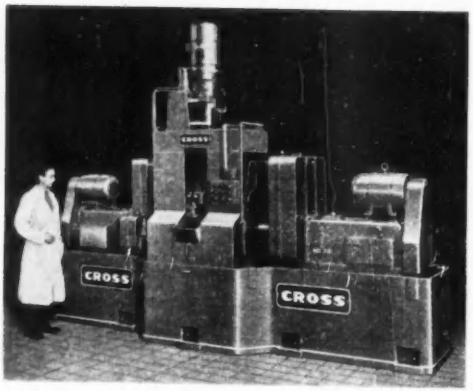
State	Passenger Cars(1)		Trucks		Buses		Total Motor Vehicles	
	1949	1948	1949	1948	1949	1948	1949	1948
Alabama	403,200	388,328	137,000	127,065	2,100	2,065	542,300	495,458
Arizona	176,290	161,436	52,000	48,647	750	813	228,950	210,896
Arkansas	286,000	254,651	135,700	125,161	2,700	2,637	424,400	382,449
California	3,364,162	3,057,671	563,900	529,492	(2)	6,834	3,928,062	3,593,997
Colorado	377,500	352,305	120,800	115,006	(2)	(2)	498,300	467,311
Connecticut	533,800	508,390	79,475	75,691	2,685	2,587	615,960	586,668
Delaware	72,000	65,810	17,750	17,557	(2)	(2)	89,750	83,367
District of Columbia	153,056	142,440	18,436	18,389	2,100	1,198	173,591	162,025
Florida	686,000	621,443	170,000	156,639	3,450	5,786	871,450	783,868
Georgia	585,000	540,903	175,000	167,525	5,000	4,965	765,000	713,393
Idaho	167,000	156,984	62,150	59,644	(2)	(2)	229,150	216,508
Illinois	2,070,000	1,899,690	340,000	315,988	1,000	.....	2,411,000	2,215,678
Indiana	1,116,000	1,089,447	240,000	227,480	9,000	9,530	1,364,000	1,295,457
Iowa	662,000	732,558	169,400	150,972	(3)	(3)	971,400	883,531
Kansas	618,200	572,433	196,300	183,733	(3)	(3)	814,500	756,165
Kentucky	502,600	466,502	145,800	137,711	(2)	(2)	648,400	607,213
Louisiana	466,900	383,352	137,100	122,935	3,900	3,514	607,500	519,801
Maine	184,000	183,162	61,500	62,210	410	433	245,910	245,805
Maryland	606,800	470,394	92,400	90,935	3,900	3,900	695,100	565,229
Massachusetts	1,023,000	943,982	153,000	151,639	5,940	5,724	1,181,940	1,101,285
Michigan	1,900,100	1,748,023	265,000	258,688	(3)	(3)	2,165,100	2,006,712
Minnesota	877,000	782,919	183,000	163,756	390	399	1,060,390	946,674
Mississippi	272,000	241,419	126,700	117,537	3,800	3,532	402,500	362,488
Missouri	915,000	876,882	235,000	222,608	5,000	4,940	1,155,000	1,104,130
Montana	155,000	145,402	75,000	70,391	(3)	(3)	230,000	215,793
Nebraska	434,700	368,565	122,100	105,750	829	940	557,729	505,155
Nevada	53,300	47,573	15,200	13,417	(3)	(3)	68,500	60,990
New Hampshire	124,300	117,301	27,600	31,823	2,900	(3)	155,000	149,124
New Jersey	1,110,000	1,109,148	198,000	198,280	10,500	6,890	1,318,500	1,315,298
New Mexico	136,800	126,482	48,400	45,696	866	993	186,166	173,181
New York	2,810,000	2,666,100	501,230	490,971	11,900	41,370(4)	3,322,750	3,198,449
North Carolina	695,606	655,569	177,500	167,524	2,800	2,941	875,906	826,334
North Dakota	173,000	169,901	78,000	68,919	150	124	251,150	238,944
Ohio	2,290,000	2,086,622	300,000	296,256	3,900	3,629	2,593,900	2,386,548
Oklahoma	538,000	509,709	180,000	162,941	6,300	6,271	724,300	678,921
Oregon	496,800	448,545	124,700	115,648	1,240	1,496	624,740	585,689
Pennsylvania	2,331,000	2,219,000	419,800	416,551	12,700	12,800	2,763,500	2,648,351
Rhode Island	202,960	188,949	30,800	29,662	620	656	234,280	219,267
South Carolina	396,500	357,285	101,400	91,849	2,800	2,918	500,700	452,052
South Dakota	199,000	185,960	68,000	60,163	350	305	267,350	246,328
Tennessee	539,000	518,004	144,000	139,020	2,000	2,716	685,000	659,940
Texas	1,952,200	1,779,748	530,000	526,000	6,000	5,518	2,488,000	2,310,266
Utah	177,000	162,179	42,750	39,837	650	578	220,400	202,394
Vermont	99,200	95,861	15,150	15,355	180	173	114,530	111,389
Virginia	662,950	576,345	152,000	148,058	(3)	2,069	814,950	726,472
Washington	661,900	620,689	180,000	145,787	9,200	4,721	849,100	771,197
West Virginia	321,400	271,976	97,000	96,217	1,400	1,273	419,800	359,466
Wisconsin	902,000	829,100	211,000	196,803	13,000	12,864	1,126,000	1,038,767
Wyoming	90,000	83,794	35,000	31,709	.....	.....	125,000	115,493
Total	35,555,832	33,099,941	7,732,861	7,309,227	140,512	169,928	43,429,205	40,477,796

(1) Includes taxicabs. (2) Included with trucks. (3) Included with passenger cars.

E-71—Special Machine For Axle Shift Forks

Adaptability of special machine tools is illustrated by a new machine recently designed and built by the Cross Co. of Detroit, Mich., and delivered to a prominent axle manufacturer for machining axle shift forks of two-speed truck axles. The machine performs 12 different operations on 87 pieces per hr at 100 per cent efficiency and with only one unskilled operator. It is designed to handle eight different part sizes.

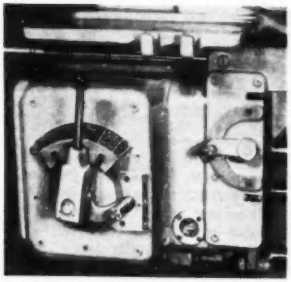
Four stations are provided. The first station is used for loading and unloading; at station 2, large and small holes are drilled in the boss of the shift fork; at station 3, the large hole is reamed, and two bosses are milled together with the slot in the shank; at station 4 two holes in the fork are drilled and reamed while the ends of the large hole are spot faced and chamfered. To provide flexibility for part design changes and also to permit easy maintenance, standard Cross sub-assemblies are utilized. Other features include fluid motor drive for power indexing, hydraulic feeds, hardened and ground steel ways, and automatic push-button working cycle.



Cross special machine for multiple machining operations on axle shift forks of two-speed truck axles

NEW Production and Plant EQUIPMENT

For additional information please use coupon on page 54



Close-up of all-sliding-gear quick-change box and pitch selector lever on the Jones & Lamson turret lathe

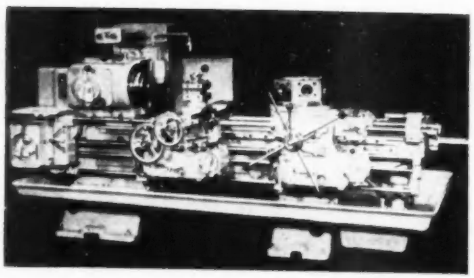
E-72—Universal Turret Lathe

The Jones & Lamson Machine Co., Springfield, Vt., announce their new Model 7A saddle type universal turret lathe, with 2½ in. bar and 12 in. chuck capacity. Completely redesigned the model weighs over 4½ tons without tooling.

Its new over-all functional design gives special consideration to the greatly accelerated developments in high surface speed metal removal. Design of the bed provides increased facility in chip disposal.

Threading to maximum turning length with carriage or saddle is made possible by a full length lead screw. An all-sliding-gear quick-change gear box with a single lever pitch selector, provides a wide range of pitches. Both cross slide and saddle are equipped with power rapid traverse. The turret is power indexed.

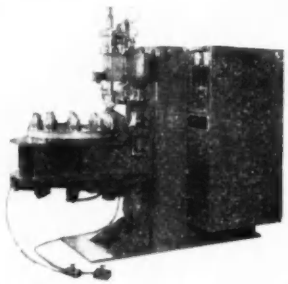
Two ranges of twelve spindle speeds, 20 to 1000 rpm or 30 to 1500 rpm, are available, with a constant speed motor. Selection is made by a single lever speed selector.



Jones & Lamson saddle type universal turret lathe, Model 7A

E-73—Dial Feed Welder Device

A dial feed mechanism affording a merry-go-round for resistance welding in order to cut man-hours and increase quality is provided on a special welder produced by Sciaky Bros., Chicago, Ill. The welder is designed to weld an electric motor-housing composed of seven parts. Parts are loaded on a 10-station indexing table by hopper and magazine feeds and welded at the rate of 2000 units per hr. The table is ratchet actuated and synchronized with the welder.



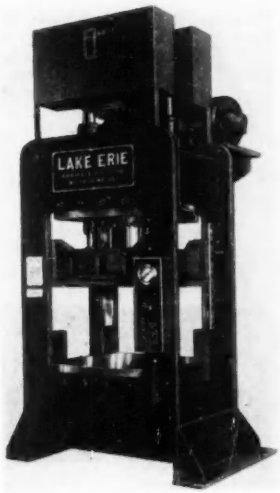
Sciaky welder with automatic dial feed mechanism affording merry-go-round resistance welding

Shaped mandrels mounted on the table serve as loading fixtures for parts other than those being welded. Where the automatic feeding is not practical, the piece parts are loaded by operators manually. The parts welded are 0.017 in., 0.023 in., 0.029 in. cold rolled steel. After welding, the completed unit is automatically ejected into a receiving bin.

The Sciaky welder used for this job makes the three-thickness-weld on a power rating of only 100 kva. The automatic nature of the machine's dial feed operation is declared to make for

higher and more consistent quality welds and positively accurate location of the piece parts.

E-74—Line of Hydraulic Presses



Standardized line of series DF hydraulic metal working presses put out by the Lake Erie Engineering Corp., Buffalo, N. Y., is said to eliminate need of larger, more expensive semi-custom-built presses heretofore required for limited volume metal product manufacture. These low-cost, single-action utility and forming presses for drawing, straightening, bending, coining and other shop operations are presently available in 100 ton, 150 ton and 200 ton capacities. Each size is available with or without hydro-pneumatic cushion for deep metal drawing. All models can be equipped with normal or high speed pumping units.

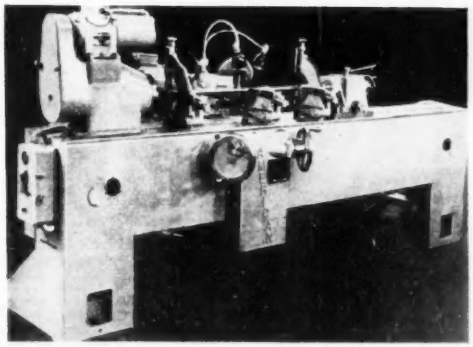
E-75—Cylindrical Broach Resharpening Machine

New type cylindrical broach resharpening machine offered by the American Broach & Machine Co., Ann Arbor, Mich., mounts the broach between centers on a stationary bed and traverses the grinding wheel from tooth to tooth for faster more accurate resharpening. The machine resharpens internal broaches such as involute splines, helical splines, hexagon, cam shaped, irregular formed, serration and combination type.

Called to attention is the reduction in floor space required due to the fact that the stationary bed mounting for the broach eliminates the over travel on the ways such as is a standard practice on conventional models.

The new unit includes micrometer dial control wheels for the lateral traverse of the carriage and infeed of the grinding spindle; variable speed drive for the rotation of the broach; antifriction bearing rollers and hardened and ground carriage mounting rails.

Two model sizes available for the resharpening of round type broaches are the RBS-9-84 for broaches up to 9 in. in diam and up to 84 in. in length, and the RBS-9-60 for broaches up to 9 in. in diam and 60 in. in length.



Cylindrical broach resharpening machine of the American Broach & Machine Co.

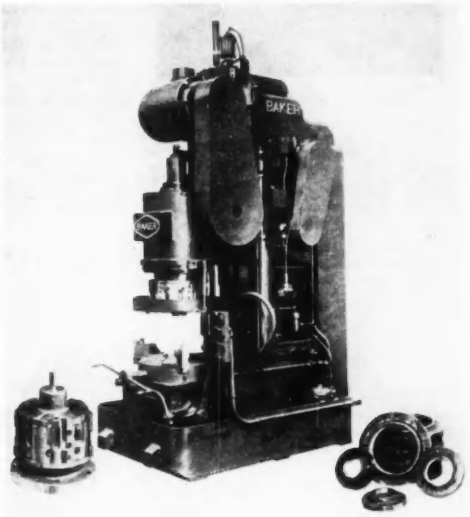
NEW
Production and Plant
EQUIPMENT

For additional information please use coupon on page 54

E-76—Pipe Flange Machine

On pipe flange operations the new Baker 30H04 machine produced by Baker Brothers, Inc., Toledo, Ohio, greatly reduces operating time in boring, reaming, threading and counterboring on cast iron pipe flanges. The machine is equipped with a 3-jaw scroll and chuck, and handles all size flanges from 3 in. to 16 in. pipe size. Murchey special full receding pipe taps with quick-change chasers and reamer blades perform the boring, reaming, threading and counterboring operations in rapid succession. The machine is equipped with a worm and worm gear drive head and is arranged with sliding gears providing two speeds plus kick-off speed change gears. Operating cycle is as follows:

No. 1. There is a rapid advance of saddle through hydraulic feed pressure to the predetermined point where the



Baker machine for operations on pipe flanges

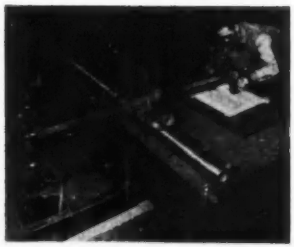
taper reaming operation begins. Cycle is controlled through limit switches.

No. 2. Half nut then closes to provide positive lead screw feed of the saddle for the reaming, tapping and counterboring operation.

No. 3. At completion of operations, the half nut opens and the saddle is rapdly returned to a raised position by hydraulic pressure.

E-77—Shape-Cutting Machine

Availability of a new portable, low-priced, oxyacetylene, shape-cutting machine, the Airco No. 3 Monograph, is announced by the Air Reduction Sales Co., New York, N. Y. Designed to bring machine gas cutting within eco-



Airco No. 3 monograph in action.

nomic reach of shops which have been unable to handle their own shape-cutting, the Monograph cuts steel up to 8 in. in thickness, in any shape within a 56 in. by 32 in. area, at speeds ranging from 3 to 30 in. per min. Length of cutting area can be extended by adding tubular rail extensions. The machine also handles straight-line, circle and bevel cutting jobs.

The Monograph weighs only 110 lb, and the tubular rail an additional 35 lb, making a portable machine that can be transported from shop to shop or to the work. The entire unit is packed in a carrying case that can be handled by two men and stored in a 7 ft by 1½ ft space.

Included is a manual tracing device, torch, tip, tubular rail, hose, straight edge, and radius rod.

E-78—Underfeed Clinchor

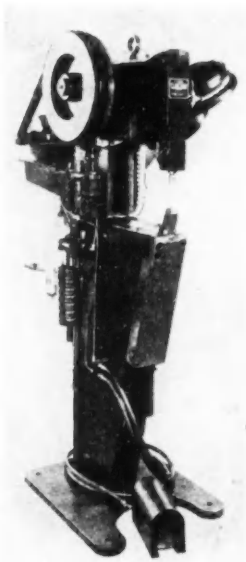
An underfeed clinchor, available in a standard model with vertical anvil and anvil guide, and a special model with inclined anvil and anvil guide, are new products of the Tomkins-Johnson Co., Jackson, Mich., designed to automatically feed and set standard square neck cased nuts, which have also been furnished for handling floating type cased nuts and various sizes of Fabri-Steel nuts.

The standard underfeed clinchors have advantages in flexibility as these machines handle a greater variety of sizes and types of nuts than clinchors with inclined anvil. On the other hand, the inclined anvil and anvil guide permit use of the special clinchors for setting nuts in certain parts that could not be handled on the standard model because of the restricted clearances in the parts.

These underfeed clinchors are said to provide advantage over the transfer ram type clinchors in that the nuts are fed from underneath the work, and there is no transfer ram to strike that part if it is not removed from the machine after each nut is set.

The operator loads clinch nuts into a hopper at the top of the machine, which feeds the nuts, by means of an in-built underfeed mechanism, to the anvil. The operating sequence is: (1) Operator places part in machine, properly locating clinch nut in hole in the part; (2) operator presses foot pedal, causing the ram to descend and set clinch nut firmly in the part; (3) instantly, when one nut is set, the underfeed mechanism reloads the anvil ready for the next operation. The machine is fully automatic controlled by a single foot pedal.

Capacity of the standard machine is 9/16 in. OD to ¾ in. OD "D" type clinch nuts, 17/32 in. to 29/32 in. square "Case" type clinch nuts, and extruded type clinch nuts. Range of throat depth is 8 in. to 36 in. inclusive.



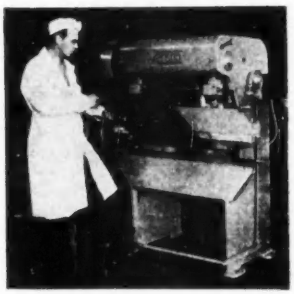
Tomkins-Johnson underfeed clinchor with inclined anvil and anvil guide

NEW Production and Plant EQUIPMENT

For additional information please use coupon on page 54

E-79—Small, Power Press Brake

To replace hand press brakes and eliminate tying up big machines on small odd jobs, a new low priced power press brake has been developed by the Verson Allsteel Press Co., Chicago, Ill., designated the Verson 16-48, having a bed and ram length of 48 in. Its rated air bending capacities range from a 18 in. length of 16 ga. stock (over a ½ in. opening) to a 24 in. length of 10 ga. stock (over a 1¼ in. opening.)



Verson small power press brake, No. 16-48

In the 16-48 unit all steel construction is employed to assure perfect alignment and maximum rigidity. All gears are steel with machine cut teeth. Eccentric and intermediate shafts are mounted in solid renewable bronze bushings. Totally enclosed friction clutch and self releasing band brake are employed. Alemite hand fittings are provided for lubrication. Variable speed arrangement provides 20 to 50 strokes per min operation. Where portability is required, the 16-48 may be mounted on casters.

E-80—Flexible Shaft Machine

New model "series M" Kellerflex—a flexible shaft machine brought out by Pratt & Whitney, Division of Niles-Bement-Pond Co., West Hartford, Conn., provides for an almost limitless variety

(*Turn to page 92, please*)

For a LIGHTER Yet STRONGER Product...

Put the squeeze on "DEAD WEIGHT"

If your product is made of steel, it may be made lighter and more efficient—yet stronger and more durable—if it is made of HI-STEEL. Inland HI-STEEL permits the use of much greater unit stress in design, and has 50% greater ability to stand up under impact loads. That's why HI-STEEL sections can be up to 25% thinner—thereby minimizing dead weight and permitting one-third more units to be produced from every ton of your steel. In addition, HI-STEEL is far more resistant to abrasion and to atmospheric corrosion. It can be easily worked, hot or cold.

Write for booklet. INLAND STEEL CO., 38 S. Dearborn St., Chicago 3, Ill. Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

HI-STEEL meets the requirements of SAE Specification 950.

INLAND HI-STEEL

INLAND STEEL

REG. U. S. PAT. OFF.

THE LOW-ALLOY HIGH-STRENGTH STEEL

F-105—Air Cylinders Without Tie Rods

A new line of air cylinders of improved design without tie rods is announced by the Tomkins-Johnson Co., Jackson, Mich., for use with the same range of air pressures as the company's "tie rod type" line—80 lb psi to 100 lb psi. The cylinders are offered in seven different styles, up to 8 in. bore and are available with or without adjustable cushions.

Eliminating the tie rods is said to improve the appearance of the cylinders, and of the equipment on which the cylinders are installed, making also the external surfaces of the cylinders easier to clean. The new construction eliminates stretching of tie rods, too, especially in very long stroke cylinders, where leakage could thereby occur between the cylinder heads and the cylinder body. In the new type air cylinders, the cylinder body is not subjected to longitudinal compression stresses, commonly called column stresses, such as are always present when tie rods are used. In extremely long stroke tie rod type cylinders, especially in the smaller bore sizes, unequal tension in the tie rods can actually bend the cylinder body, causing serious misalignment and poor operating characteristics in the cylinder.

Instead of tie rods, round snap rings are seated in grooves in the cylinder body, and steel clamping collars are used. Grooves in the cylinder body are rounded, to fit the round spring steel wire snap rings. Clamping collars are designed to hold the snap rings firmly against bottoms of grooves in the cylinder body, providing support for cylinder body at these points. Standard heat-treated socket head cap screws, made of high tensile strength steel, are employed to attach clamping collars to cylinder heads.

The new cylinders are offered in addition to present lines of cylinders with "tie rod type" construction, which include air cylinders for power movement from 100 lb to 12,000 lb (direct), and hydraulic cylinders for power movement from 1000 lb to 75,000 lb (direct).

Tomkins-Johnson new line of air cylinders without tie rods

NEW ★ PRODUCTS

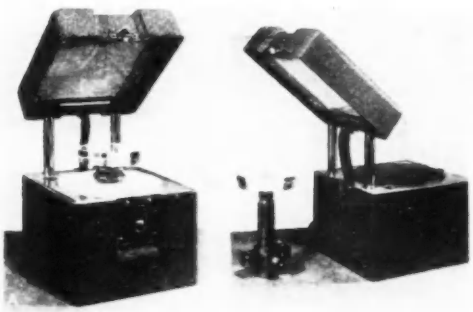
For additional information please use coupon on page 54

F-106—Optical Flats and Monochromatic Lights

Precision-measuring Lapmaster optical flats and monochromatic lights for checking flatness accuracy to less than one light band (0.0000116 in.) are being marketed by the Crane Packing Co. of Chicago, Ill.

The Lapmaster monochromatic light provides better than 25-ft candle power illumination on the checking surface. Its helium gas filled tubular light is recessed into the cover and diffuses light through a flashed opal diffusing glass. Light transmitted is a strong, near one-color light of 11.6 millionths of an inch per dark interference band. Light source and checking stage are a self contained unit, in aluminum case. The unit is easily moved by means of an attached handle, and is adjustable from the stage type to a bench type by rotating the head 180 deg.

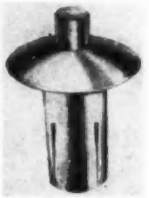
Lapmaster optical flats are of top quality natural quartz. Highly transparent, they are said to have exceptional wear characteristics, to be abrasion resistant and to withstand thermal shock. Flats of 1/10 light band, accuracy (0.00000116 in.) and 1/5 light band accuracy (0.00000232 in.) are standard. Sizes range to 6 in. diameters.



Left:
Crane Lapmaster monochromatic light showing optical flat in "stage-type" positions. White stage being used here is a special master flat available from Crane

Right:
Lapmaster monochromatic light with light source reversed 180 deg. for light band readings on a tall work piece. Optical flat is in position on top of work piece.

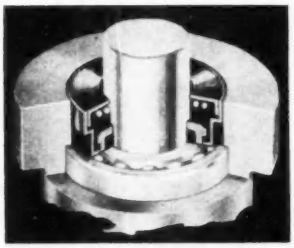
F-107—Tubular Blind Rivet



Fastening of metal - to - metal or metal-to-wood is simplified by use of the Southco blind rivet manufactured by the South Chester Corp., Phila., Pa. A grooved insert pin, factory-fit into the slotted tubular rivet body, is driven flush with the rivet head by a hammer blow, which expands the rivet and spreads its prongs, insuring a rigid joint. The rivet is stocked in 3/16 and ¼ in. diameters, with modified brazier and 100 deg countersunk head styles, and grip lengths ranging from 3/32 to ⅝ in.

F-108—Carbon-Graphite Sealing Ring

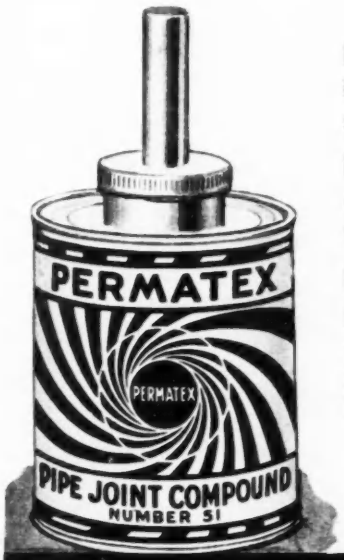
A Graphitar sealing ring is an integral part in the new Gits package unit shaft seal made by Gits Bros Mfg. Co., Chicago, Ill., according to the United States Graphite Co., Saginaw, Mich. Graphitar is the latter company's carbon-graphite product that can be made into bearings, bushings, pistons and close - lapping seals of varied design. The Gits seal embodies both rotating and stationary sealing surfaces within the packaged unit, with the Graphitar ring being used as the stationary seal.



Graphitar sealing ring of the United States Graphite Co., shown in the new package unit shaft seal put out by Gits Bros.

Graphitar, an inert material, is un-

(*Turn to page 98, please*)



PERMATEX PIPE JOINT COMPOUND No. 51 is applied with a brush. It spreads evenly over threaded surfaces . . . and stays put!

Does not harden or crack. Remains flexible and resistant to continual vibration. Assemblies can be adjusted easily . . . without breaking seal.

PERMATEX PIPE JOINT COMPOUND No. 51 produces unions that are leak-proof to hot or cold water, salt water, steam, illuminating gas, lubricating oils and greases, fuel oils, gasoline, kerosene, ethylene glycol and many other liquids and gases.

PERMATEX COMPANY, INC.
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PERSONALS

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

Ford Motor Co.—**William D. Singleton** has been appointed Production Manager of all the company's Ford Division assembly plants. Mr. Singleton was formerly Manager of the Ford plant in Chester, Penna.

Ford Motor Co.—**J. E. Lundy** and **V. G. Brink** have been appointed Assistant Controllers. The appointment of **Verne W. Helard** as Asst. Sales Manager of the Fleet Sales Section has been announced. Four appointments to new positions in the parts and accessories sales department, Ford Division, have been announced. **Donald C. Burdette** has been named Asst. Parts and Accessories Sales Manager. **Byron R. Lenhardt** has been made Parts Sales Manager. **John B. Langley** is Accessories Sales Manager and **D. R. Matthews** has been named Sales Promotion and Training Manager in the parts and accessories sales department.

Hudson Motor Car Co.—The appointment of **George R. Browder** as Asst. Director of Advertising and Merchandising, has been announced.

Hudson Motors of Canada, Ltd.—**C. R. Gall** has been appointed Vice-President.

General Motors Corp.—The appointment of **A. J. Campau** as Director of the Purchasing and Salvage Section has been announced. Mr. Campau succeeds **D. F. Hulgrave**, who is now executive in charge of procurement and schedules activities of the GM manufacturing staff.

Willys-Overland Motors, Inc. — **C. Coyle Smith** has been named Asst. to the 1st Vice-President. **Robert Montgomery** has been made General Parts Manager.

Borg-Warner Corp., Ingersoll Steel Div.—The appointment of **Frank J. Nugent** as Sales Manager of the Heating Equipment Div. has been announced. **Harry L. Spencer** has been appointed to be Vice-President in charge of manufacturing and engineering, Norge Div.

The Electric Auto-Lite Co.—Appointment of **George A. Sauer** as Supervisor of Div. Offices, Merchandising Div., with headquarters in Toledo, has been announced. **Paul Becker** has been made Manager of the new wire and cable plant in Hazleton, Penna.

The Cleveland Graphite Bronze Co.—The election of **Raymond Z. Oswald** as Vice-President has been announced. Mr. Oswald will be in charge of replacement sales.

E. I. du Pont de Nemours & Co.—The promotion of **Joseph J. Mikita**, to the position of Asst. Technical Manager in the Petroleum Chemicals Div., has been announced.

The Dow Chemical Co. — **Arthur Smith, Jr.**, has been appointed Director of Public Relations.

The Allison Co.—The appointment of **Curtis D. Cummings** as Sales Manager has been announced.

The Austin Co.—The election of **A. T. Waidelich** as Vice-President in charge of Research has been announced.

Necrology

Edward R. Stettinius, Jr., 49, formerly Secretary of State, chairman of board of the U. S. Steel Corp., and vice president in charge of industrial and public relations for GM in 1931, died on Oct. 31 in Greenwich, Conn.

Walter F. Zimmer, 68, founder and chairman of the board of Zimmer-Keller, Inc., Detroit advertising agency, and a former member of the business staff of *Horseless Age* later combined with AUTOMOTIVE INDUSTRIES and absorbed by the Chilton Co., died on Oct. 27 in Grand Rapids, Mich.

Rex Mays, 36, famed automobile racer and former A.A.A. national champion, was killed during an automobile race at Del Mar, Calif., on Nov. 6.

R. D. Fageol, 41, bus accessory manufacturer and president of the R. D. Fageol Co., Detroit, died on Nov. 1 in Detroit.

Charles S. Traer, 59, chairman of the board, Acme Steel Co., Chicago, died on Oct. 25, 1949.

Howard C. Lisle, manager or supervisor, John Bean Div., and vice president of Food Machinery and Chemical Corp., died on Oct. 12 in Lansing, Mich.

Earl F. Reinhart, 51, president, Republic Drill and Tool Co., Chicago, died Oct. 20 in New York City.

Douglas B. Hobbs, 49, in charge of motion pictures, educational, and technical information activities, public relations dept., Aluminum Co. of America, died on Oct. 11 in New York City.

Industrial Rayon Corp. — **Bjorn F. Benson** has been appointed a member of Industrial Rayon Research Staff.

National Carbide Corp. — **Robert A. Speck** and **George R. Milne** have been appointed Vice-Presidents of the corporation. Mr. Speck is in charge of sales and distribution and Mr. Milne in charge of operations.

American Welding Society—**O. B. J. Frazer** is the new President of the association and **A. F. Davis** has been elected a Director.

Air Reduction Co., Air Reduction Sales Co.—The appointment of **H. R. Salisbury** as President has been announced.

Thompson-Bremer & Co. — **Sam T. Keller Company** have been appointed representatives for the state of Michigan. Associated with Mr. Sam Keller are **S. S. Shirley** and **Howard F. Wolfe**.

Keller Motors Corp.—The election of **George M. Fisher** as President, succeeding the late George D. Keller, has been announced.

Firestone Tire & Rubber Co. — Appointment of **Dr. John N. Street** to the position of Director of Chemical Laboratories has been announced.

Curtiss-Wright Corp., Propeller Div. —**Ronald S. Gall** has been appointed Public Relations Manager.

Mack Trucks, Inc. — Appointment of **W. J. Corr** as Director of Service has been announced. **R. W. Walker**, Mack-International Vice-President, has been named Manager of the company's newly created Eastern Div.

The Four Wheel Drive Auto Co.—**W. G. Klaus** has been appointed Office Sales Manager and **G. D. DeCoursin**, Field Sales Manager.

The Osborn Manufacturing Co. — **George R. Lundberg** has been appointed Director of Advertising and Sales Promotion.

United States Rubber Co.—The appointment of **Fred A. Sawyer** as Manager of Automotive Sales has been made.

Superior Steel Corp.—The directors have elected **William M. Cowles** Sales Vice-President.

Vic Pastushin Industries, Inc.—**Carl W. Luthey** has been made Factory Manager.

Lear, Incorporated.—**Thomas M. Belshe** has been made Vice-President.

The Cooper Alloy Foundry Co.—The promotion of **Jack Victorine** to the position of General Sales Manager and

(*Turn to page 64, please*)

French Automobile Show

(*Continued from page 29*)

and two compressor cylinders. It is a prototype with full pressure lubrication.

Internationally this year's show was stronger than any of the predecessors, with 18 American, 13 English, six Italian, three Czechoslovakian and two German car manufacturers represented. Foreign cars can only be sold against foreign currency and if the purchasers reside in France they are not allowed to resell within two years.

The Germans were Mercedes-Benz and Meteor. The former is producing the 170 S in sedan and cabriolet, featuring an L-head engine of 107 cu in. developing 52 brake hp. It has an oval section tubular frame, narrow at the center but splaying outwards at the front and rear to receive the engine and the axle, and with outriggers to carry the body. Front wheels are independently sprung by support arms and vertical coil springs and the Mercedes-Benz swinging axle, with inclined coil springs, is used at the rear. Although not in the show, Mercedes-Benz is producing a Diesel interchangeable with the gasoline engine, on the same chassis. Its output is 38 hp at 3000 rpm and fuel consumption is 34 miles per American gallon of fuel.

The Meteor-Veritas is in the sports and racing class, produced at Messkirch (Bade) and designed by former B.M.W. engineers. A 122 cu in. six cyl, it is light alloy construction, with a compression ratio of 12 to 1 for racing, three Solex carbureters and a five speed transmission. A second head with lower compression ratio is supplied as an optional.

Practically the entire Italian industry was united in the Grand Palais, but the models were those which have already been uncovered. Fiat really duplicates the French Simca line, with the 30 and 67.1 cu in. four cyl and the 91.5 cu in. six cyl model. The 1100S is a sports version of the standard car, with a modified engine developing 51 hp at 5200 rpm. The styling of this has been turned over to Pinin Farina, who has produced an elegant two passenger sedan with rather more space than on the original Fiat body and a roof more pronouncedly sloping down to the rear.

Since the war, Italian specialists have secured a very strong position in body design and construction and Turin and Milan firms are designing bodies for foreign automobile manufacturers. In the Grand Palais there was a grouped Italian display of body work by Viotti, Monviso, Ghia, Siata, Farina, Castagna, Pinin Farina and Boneschi. A feature on a Castagna body was transparent plastic air inlets, to left and right of the main air inlets, with small parking lights buried in the transparent plastic. This firm showed windshield and side windows without frames, giving total vision under the Labourette patents. On all the Italian makes door handles are horizontal and flush, being opened by a push button. Boneschi had a four door sedan on the 67.1 cu in. chassis, full width, pontoon sided, with no pillars between the doors, the total weight for the six passenger being 2068 lb. Construction was steel frame with aluminum panels.

For some time the French industry has been operating a joint experimental and technical department, which to a considerable degree was under government control. The government collected a certain percentage on manufacturers' turnover and used it for this experimental work. Recent changes have placed this organization, now known as the U.T.A.C., entirely in the hands of the manufacturers, with central offices in Paris, it has a well equipped laboratory on the edge of the city and Montlhery test track only a few miles away.

What a Cold, Calculating Beating this Lug takes!

IT'S NEW! IT'S DIFFERENT! IT'S MADE OF REVERE COPPER —The "Double G" Solderless Lug made by THE GREGORY MANUFACTURING CO., INC., New Haven, Conn., for the electrical field, comes in 6 sizes to accommodate from 14 ga wire to 1,000,000 CM cables. Pressure screws are steel.

HOLD 'EM TIGHT—These sharp, deep-cut serrations on inside of both tubular sections and projection tang help to make firm, non-slip joints possible. They also increase the rigidity and conductivity of the connection. Note that these serrations were made cold, and without any distortion of the Revere Copper used. Lugs shown are twice actual size and are unretouched.

...and not a Scar to show for it!

Improved solderless lug of hard drawn Revere Copper, cold worked over and over without distortion, cracking, pitting or scarring.

Pierced, formed at short 45 degree and 90 degree angles and deeply serrated, this "Double G" solderless lug really gets a working over . . . and cold, too, no annealing. Yet, with all this, the surface remains absolutely smooth, the lug is not in any way weakened and there is no twisting, pitting, cracking or scarring of any kind. And, in addition, its dimensions are held.

When the Gregory Manufacturing Co., Inc., was developing this solderless lug, with its unusual features, it had a problem on its hands.

Their design called for copper strip that could stand a lot of cold working and when finally fabricated into a product of uniform quality, would not have a lot of twist, cracks, pitted or scarred surface. In their efforts to secure such a product their engineers had frequent consultations with Revere's Technical Advisory Service. The result was the product shown and described above, with production time and money saved and rejects held to the vanishing point. The material used was Revere hard drawn copper strip with a temper of 36 to 46 Rockwell B Scale. This company feels that they could not have developed such a successful product if the quality of the copper was not of the best and did not possess the inherent working characteristics needed.

Perhaps Revere Copper or some other Revere Metal can be of help in developing or improving your product—cutting your production costs. Why not tell Revere's Technical Advisory Service about your metal problems? Call the Revere Sales Office nearest you today.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.—Sales Offices in Principal Cities, Distributors Everywhere.

PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

D-115 Power Presses

Clearing Machine Corp.—Design features of Clearing open back inclinable presses are presented in a new catalog, No. 211. The catalog, an 8-page, 2-color book, also describes the Claring swing key clutch and pneumatic friction clutch, and accessories.

D-116 Generators

Electric Machinery Mfg. Co.—A new 8-page, 2-color bulletin tells in nontechnical terms the points to look for when ordering generators. Exclusive construction features are pointed out and illustrated. Many recent installations of large slow-speed engine-type generators are shown.

D-117 Cylinder Assemblies

Hydraulic Equipment Co.—A new 4-page illustrated folder on standard design, single and double-acting cylinder assemblies is available. Recommended operating pressures, effective diameter and stroke required, plus other vital information are completely covered.

D-118 Rust Preventives

E. F. Houghton & Co.—Entitled A New All-Star Line-Up of Rust Preventives, a new 8-page booklet describes and lists the many uses for each of the eleven RUST VETO products developed by the company. A full-page chart outlines the physical properties of each Rust Veto and lists such information as thickness and type of film.

D-119 Radiant Tube Heating

Holcroft & Co. — An 8-page illustrated bulletin on radiant-tube heating of controlled atmosphere head treat furnaces is available. It discusses the development and design of radiant tubes. It describes and illustrates the flame characteristics required in fuel-fired tubes; defines the burner performance features, etc., and describes a quick-change combination burner that permits either gas or oil firing. Electrically-heated radiant tubes are covered.

D-120 Helical Gear Drives

Foote Bros. Gear and Machine Corp. —A new 16-page Engineering Manual, MPA, on its line of Maxi-Power Enclosed Helical Gear Drives, has been announced. It contains complete ratio information, horsepower rating tables, simplified selection procedure, overhung load capacities, assembly diagrams, dimensions and weighs of single, double and triple reduction units.

D-121 Patterns and Castings

Howard Foundry Co. — Castings by Howard is the title of a new 72-page book. A section is devoted to the fabrication of zirconium alloys for jet and turbine engine parts. Also included is helpful, understandable information of the casting of aluminum, magnesium, brass, bronze and semi-steel, as well as numerous tables showing mechanical properties, chemical analyses and physical characteristics of these metals.

D-122 Disc Wheels for Rotary Sanders

Raybestos-Manhattan, Inc. — A new bulletin is available which describes the Manhattan Moldisc, a new bonded disc wheel for rotary sanders.

D-123 Metal Working Presses

Lake Erie Engineering Corp.—Bulletin 749, a 4-page, 2-color folder gives basic specifications for a new series of

(*Turn to page 56, please*)

TIME SAVER COUPON for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

Readers Service Department,
Automotive Industries,
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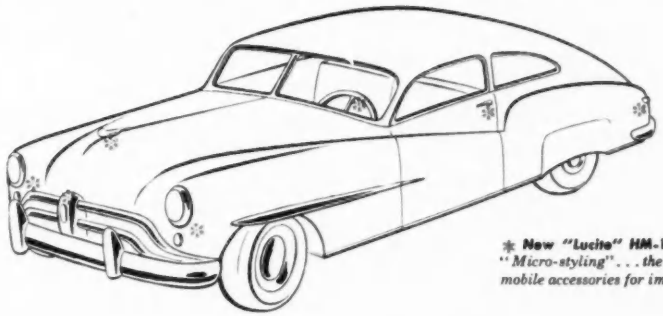
IMPROVED ACRYLIC RESIN FOR ACCESSORY STYLING!

DU PONT LUCITE HM-140

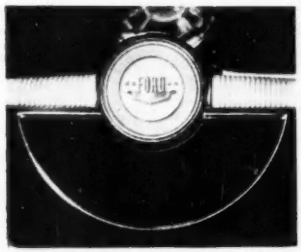
REG. U. S. PAT. OFF.

HAS BETTER MOLDING PROPERTIES... BETTER COLOR

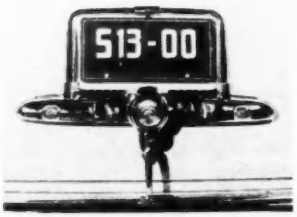


** New "Lucite" HM-140 fits right into your plans for "Micro-styling"... the design of small but important automobile accessories for improved appearance and utility.*

Provides added beauty and utility in hood ornaments · horn buttons · lamp lenses · reflectors · medallions · dials



A handsome horn button of sparkling "Lucite" in beautiful three-dimensional colors. Looks smooth . . . is pleasant to the touch . . . on 15 makes of cars using horn buttons of "Lucite." (Horn button molded by Erie Resistor Corp., Erie, Penna.)



Reflectors and lenses of "Lucite" are weather-resistant, non-fading. Reflectors are molded with such accuracy that they reflect beams of headlamps more than a quarter-mile away. (Reflectors for six makes of cars molded by Stimsonite Plastics, Chicago.)

New "Lucite" HM-140 molding powder offers improved features for the automotive industry. It has better molding characteristics and is even more water-white than well-known "Lucite" HM-122.

Since the introduction of "Lucite" in 1937, Du Pont has continued to develop improved acrylic resin compositions for the automotive industry. Today, 19 makes of cars are using 138 parts molded of "Lucite." Here are some of its outstanding advantages:

UNUSUAL VERSATILITY

"Lucite" can be readily molded into an almost unlimited variety of designs. It can be molded and painted to obtain beautiful three-dimensional color effects.

LONG-LASTING COLOR

"Lucite" comes in a wide range of brilliant, colorfast hues. Transparent, translucent, or opaque, it holds its beauty through years of weathering and hard service.

SPARKLING TRANSPARENCY

The light-transmission of "Lucite" is as high as that of finest optical glass. Its remarkable ability to "edge-light" and "pipe" light around corners makes it adaptable for many special effects.

TIME-TESTED DURABILITY

On the assembly line or after years of service under the most rugged conditions, parts made of "Lucite" still retain full beauty and utility. The weather-resistance of "Lucite" is unsurpassed by any transparent plastic. It is light in weight and virtually unbreakable. In normal use, it isn't damaged by gasoline or lubricants, or by many common solvents.

WRITE FOR FURTHER INFORMATION—on "Lucite" HM-140 and other Du Pont plastics. If you wish, Du Pont technical men will be glad to consult with you in confidence and advise on applications of Du Pont plastics to fit your needs. Write to Plastics Dept., E. I. du Pont de Nemours & Co. (Inc.), at the most convenient address: General Motors Bldg., Detroit, Mich.; 350 Fifth Avenue, New York 1, New York; 7 S. Dearborn St., Chicago 3, Ill.

DU PONT
REG. U. S. PAT. OFF.
Plastics
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

standard presses having capacities of 100, 150 and 200 tons. The first part of the specifications deals with basic normal-speed, single-action operation. The second section lists specifications and operation with optional accessory equipment.

D-124 Flexible Shaft Machines

Pratt & Whitney Div., Niles-Bement-Pond Co.—Circular No. 521 describes and illustrates the new Kellerflex Series M, Flexible shaft machines. Descriptions include various features of the machines, specifications, and lists accessories.

D-125 Press Brakes

Verson Allsteel Press Co.—The company's new 16-48 Press Brakes are described and illustrated in a 4-page color folder. A list of jobs that can be performed on the machine is given; features are included and specifications. The last pages are devoted to describing and picturing other Verson products.

D-126 Non-ferrous Castings

The Wellman Bronze & Aluminum Co.—A new 16-page catalog describing the company's non-ferrous castings and wood and metal pattern operations is available. Well illustrated, the catalog covers such subjects as magnesium and aluminum alloys; polishing of aluminum; typical examples of well-cast castings; copper-base alloys; Ampco shrinkages on patterns; and other information pertinent to the production of magnesium, aluminum, brass, bronze and Ampco bronze castings. Tables giving the chemical compositions and mechanical and physical properties of the various metals as well as photographs of typical examples of castings the company produces, are included.

D-127 Push Broaches and Eccentric Adapters

The Kase Machine Co.—A new multicolored, illustrated catalog describes the complete line of Glenny push broaches and eccentric adapters. Catalog No. 12 provides operating and engineering data, specifications and prices. Cutaway photographs are used to emphasize engineering and construction features. One section of the catalog is devoted to a time study analysis in which comparisons on speed of production are shown between Glenny broach cuts and shaper cuts. Complete Broach Kits are listed with full specifications for broach sizes, interchangeable cutting blades and eccentric adapters.

D-128 Calcium Carbide

National Carbide Corp.—The Miracle of Calcium Carbide, a 16-page booklet, traces the history of calcium carbide from time of its discovery through the developments of manufacture and the current and potential usage of commercial calcium carbide, acetylene gas and calcium hydrate residue.

Rover Producing Diesels —Not Rolls-Royce

In an item on page 22, Aug. 1, AUTOMOTIVE INDUSTRIES, it was incorrectly stated that Rolls-Royce was now producing new Diesel engines. The engines referred to were first designed by Rolls-Royce, but are being built by the Meteor Works, Rover Co., Ltd., Birmingham, England.

Automobile Plating Has Bright Outlook

Plating of ornamental trim and bumpers in passenger cars is a monumental business. GM alone estimates that last year its plating production would provide a band 12 in. wide and .002 in. thick around the world or would make a roadway 20 ft wide extending from Detroit to New Orleans.

B-O-P Names Barrett Traffic Director

Dudley B. Barrett has been named traffic director of the General Motors B-O-P assembly division.

BEARING FAILURES DOWN...STEEL PRODUCTION UP

Sun Grease Increases Production by Cutting Bearing Failures 92%

Burned-out table roll bearings were causing loss of valuable production-time in a steel mill. The failures—as many as five a week—were due to the grease melting and running out as a result of heat reflected from the steel plates. Each bearing-replacement cost $80, not counting labor cost.

A Sun Engineer who was called in recommended a high-melting-point grease that had proved its ability under similar conditions.

With this Sun lubricant on the job, 92 percent of the bearing failures have been eliminated. A cash saving of about $18,000 a year has resulted, and additional economies have been realized from greater production, power savings, and lower grease costs.

Sun "Job Proved" lubricants are helping to increase production, and to cut maintenance costs, in every kind of industry. What they do for others, they can do for you. For full information, call or write your nearest Sun Office.

SUN OIL COMPANY · *Philadelphia 3, Pa.*

In Canada: Sun Oil Company, Ltd.
Toronto and Montreal

SUN PETROLEUM PRODUCTS
"JOB PROVED" IN EVERY INDUSTRY

SUNOCO

The Union Camel

(*Continued from page 25*)

with benefit of $100 per month, including old age insurance due employe under Social Security Act at time of retirement. Age 65, with less than 30 years service, pension is equal to same proportion of $100 as years of service bear to 30, including social security. Employes at sole discretion of company may work beyond 65, with no increase in monthly benefits upon retirement, but retirement is automatic at 68. Employes between 60 and 65 with 30 years service, of which at least 10 must be credited after the effective date of the agreement, may retire at a reduced benefit. Retirement for total and permanent disability is provided at age 55 or older with 30 or more years of service with benefits a flat $50 a month, less social security payments due the employe for disability.

Two important features of the agreement are:

1—If the employe loses his social security benefit by taking covered employment or for any other reason, the amount of the lost benefit still is deducted from the $100 monthly benefit.

2—If social security benefits are increased at any time in the future, the company's proportion of the pension payment shall be reduced by the same amount as the increase in social security payments.

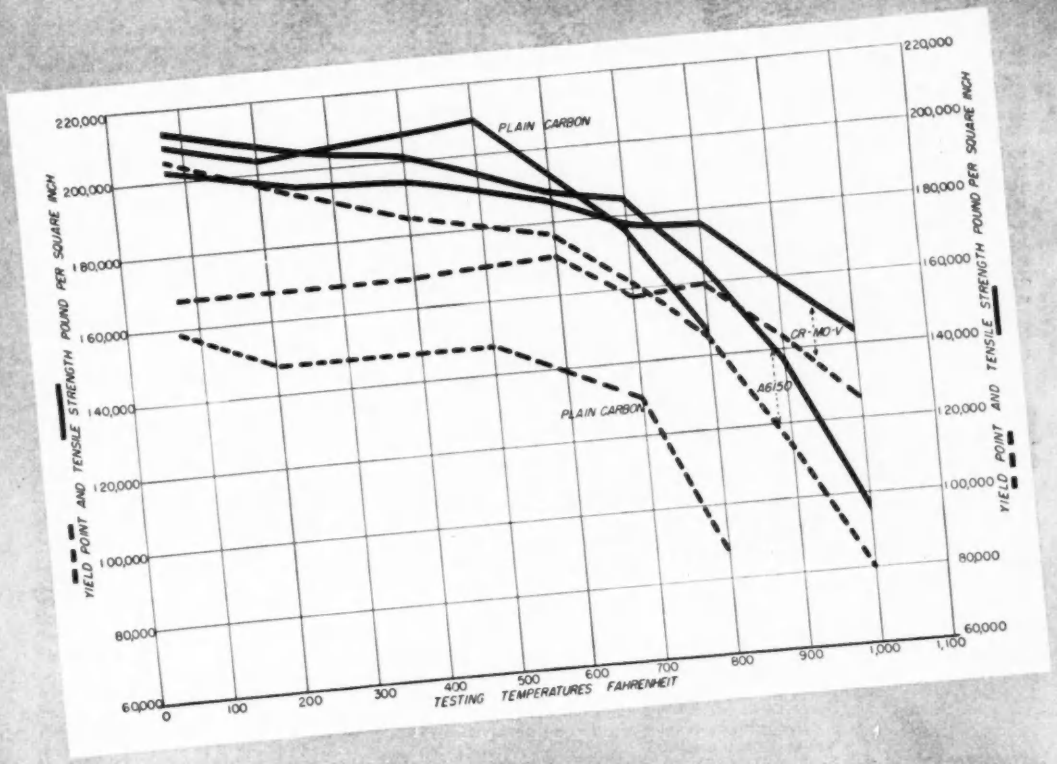
Past service credit shall be one year for each year of seniority, excluding seniority for military service before joining Ford. There is, however, a bonus past service credit for older employes. They receive an extra year's credit for each year beyond five that their total active service up to June 29, 1941 (when seriority was established), exceeds their seniority up to that date. Future service is computed according to the following formula: One year for each calendar year of 1800 or more hours work; ¾ year for 1300 to and including 1799 hours; ½ year for 750 to and including 1299 hours, and no credit for less than 750 paid hours work in a calendar year.

There is no vesting under the program other than the rights of the employe to the benefits as outlined, so that any employe disqualified for benefits, either by leaving the company before retirement or for any other reason has no claim on the pension fund. There are no death benefits in the pension agreement, and payments stop after death of the recipient.

The foregoing are the major provisions of the pension agreement. Within two weeks after ratification by the union membership, a committee of three members each from the company and union will draw up an agreement incorporating and implementing in detail the principles established in the agreement.

Cost of the agreement to Ford is estimated by the company at about

(*Turn to page 60, please*)



HIGH TEMPERATURE PROPERTIES

of Cr-V and Cr-Mo-V Spring Steels

SPRINGS FOR SERVICE at elevated temperatures require steels which resist softening and lowering of the yield point. Unless hardness and yield strength are stabilized by correct alloy additions to the steel, these properties deteriorate rapidly as the temperature is raised.

The chart above shows the yield point and tensile strength of three types of spring steel at elevated temperatures determined by standard short-time tension tests.

Springs of plain carbon steel are sometimes used at moderately elevated temperatures, although their lower yield values prevent them from giving service as satisfactory as that of the alloy spring steels.

Chromium-vanadium steel springs, such as AISI 6150, give better service at ordinary temperatures because of the higher yield point. In addition, they may be used at operating temperatures up to about 700° or 750° F because they retain high yield point values as the temperature is increased.

Chromium-molybdenum-vanadium steel was especially designed for springs operating at temperatures in excess of 750° F. It can be used for springs operating at temperatures as high as 850° F or even higher under some conditions. At 800° F, the yield point of this steel is still greater than that of plain carbon steel at room temperature.

If you have a problem in spring applications at elevated temperatures, our metallurgical engineers will be glad to help you solve it.

MAKERS OF ALLOYS — VANCORAM — CHEMICALS AND METALS

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

$20 million a year, based on present social security benefits. Whether or not the cost to the company will decline with an increase in Federal Social Security benefits appears to be a moot question. It hinges on interpretation of Section 2 of the agreement, which specifies that Ford will pay 8¾ cents an hour into the fund for each hour worked, and at the same time reserves to the company the right to vary payments into the fund in accordance with actuarial estimates of the amount needed to provide specified benefits.

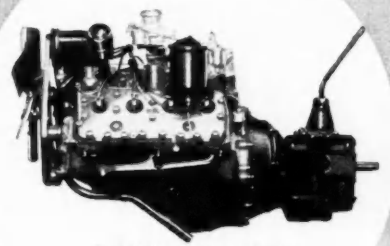
In connection with contributions paid into the fund, a Ford spokesman says that under Government tax regulations the money cannot be recovered if it is found that payments made are more than sufficient to cover benefits. If the company is not required to make payments of 8¾ cents an hour in the event that amount is not required to pay benefits, it can easily keep the fund in balance by reducing contributions when an excess builds up. On the other hand, if the flat hourly contribution must be made regardless of how little is withdrawn, a sizable surplus might accumulate, a distinct possibility if Federal benefits are increased. It is a troublesome point of interpretation, especially in view of the union's stated objective — to expand pension benefits and medical and insurance programs. It is important that Walter Reuther, president of the UAW-CIO, already considers the 8¾ cents per hour an irrevocable commitment, at least for the life of the agreement. In an editorial in *The United Automobile Worker* he states "As improvements are made in Federal Social Security, a larger portion of the company's 8¾ cents contribution . . . will be used to retire past service credits . . . *the road will be cleared for the union through collective bargaining to win additional company-financed benefits in pensions and hospital and medical programs.*" That indicates clearly how the union intends to interpret the agreement. The camel intends to get into the tent! However, nothing can be done about increasing benefit payments from the company for five years, regardless of changes in Federal benefits.

While the granting of pensions by Ford was not a surprise to the automobile industry, the news was received with misgivings by many companies, particularly the smaller ones. Two years ago, Ford offered a pension program, much more liberal than the current one, but it was turned down by the union membership. Also, the company traditionally has been singularly individualistic in labor negotiations. Nonetheless, the effect on the entire automobile industry is a profound one, because of the "pattern" philosophy that has become a fixture in recent years, amounting to industry-wide bargaining for all practical purposes. There is little doubt among industry officials that pensions in one form or another now will spread throughout the industry. Already Chrysler is in discussions with the union, where the UAW goal is a pension program substantially the same as that won from Ford. The company has maintained that pensions are not subject to discussion this year under the contract, but there is evidence that this stand is under revision. Also, since the Ford settlement two automotive suppliers have granted pensions or improved plans already in existence. Holley Carburetor Co., in Detroit, has replaced an earlier plan with one similar to the Ford agreement, providing pensions of $100 a month including Social Security. Motor Wheel Corp. has agreed to step up its pension benefits, so that payments to employes can result in benefits greater than now called for under the Ford agreement.

Smaller automobile companies appear to be resigned to going along with the pension program after the smoke has cleared away from the Chrysler negotiations and they know what to expect. There is considerable criticism of the non-contributory principle, on the grounds that demands for larger pensions will be accelerated if workers do not bear part of the cost, and it is possible that some companies may make a fight on that score. General belief

(*Turn to page 62, please*)

Here's why FORD Power is RIGHT 3 Ways!



Ford 239 V-8 Industrial Engine, with transmission. (239 cu. in. displacement)

1 **RIGHT POWER** for your job. A tailor-made choice of five great engines in the Ford Industrial Engine line — and ranging from engine alone to complete power unit!

2 **RIGHT FEATURES** — the best and the newest in industrial power, direct from Ford's famed progressive engineering laboratories.

3 **RIGHT SERVICE**, right around the corner from you . . . at Ford Dealers' everywhere!

Ford Industrial Engines make an ideal power source for cranes, shovels and similar applications. Prominent user of the Ford 239 Industrial Engine in this field is the Wayne Crane Division of American Steel Dredge Co., Inc., of Fort Wayne. Wayne Cranes are readily adaptable for use as a shovel . . . trench-hoe . . . dragline . . . clamshell . . . utility and magnet crane. Fully mobile, the patented self-leveling chassis and dual wheels with four-wheel drive permit operation wherever trucks can haul dirt.

Ford INDUSTRIAL ENGINES

For power that's *right*, *Ford's* right! Now there are five great engines in the Ford Industrial Engine line —a "four" of 120 cu. in. displacement . . . two "sixes"—226 cu. in. and 254 cu. in. displacement . . . two "V-8's"—239 cu. in. and 337 cu. in. Here's the new power, the right power for your job—farming . . . construction . . . generating sets . . . compressors . . . material handling . . . lumber and sawmill equipment . . . pumping . . . many others. For complete specifications, write today.

INDUSTRIAL ENGINE SALES DEPARTMENT

FORD MOTOR COMPANY

Dearborn, Michigan

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED

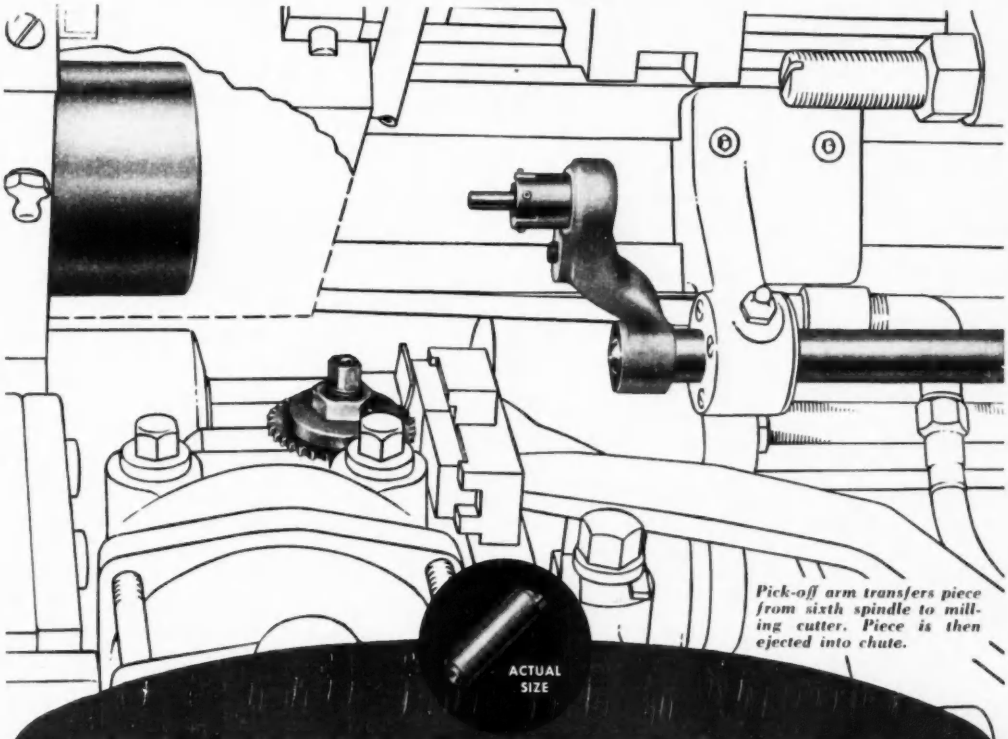
is that smaller companies will encounter considerable difficulty with financing pension programs, particularly the funding for past service. In this respect, one observer points out that companies like Packard and Studebaker, both of which have high percentages of long service employes, would be more adversely affected by past service funding. The average age of employes at Packard a few months ago was said to be the highest in the industry, more than 53 years. On the other hand, Kaiser-Frazer is in an excellent position, since even the oldest employes in point of service have only about four years past service, and the average age is in the low thirties. Another factor is that K-F currently is paying about five cents an hour into welfare benefits, which would leave only five cents to buy pensions if the formula of the 10-cent "package" is followed. Nonetheless, for the smaller companies generally, pensions pose a very real problem. As the vice president of one of them said, "Pensions are going to cause us a lot of trouble."

So far as General Motors is concerned, its contract is not open for discussion until next May. However, GM now has agreed to study the pension problem with the UAW. One interesting comment in this connection is that if pension negotiations with GM are held over to next year, the union may then not be satisfied with the same deal as made with Ford, but may fight for something more, especially if Federal Social Security benefits are increased as now seems likely.

One of the objections encountered among industry officials concerning the Ford settlement is that it in effect supports the principle of Government fact-finding panels and wage setting, regardless of the fact that Ford might have granted some kind of pension deal on its own initiative. Up to the time the fact-finding panel appointed by the President in the steel dispute turned in its recommendations that a 10-cent pension and insurance package be granted, Ford had made positive statements that the company would do nothing that would add to labor costs. However, the company switched its position when the report was made public, calling its implications "inescapable." So to all appearances, the Government panel gets credit for breaking the deadlock.

In fairness to Ford, it must be pointed out that the company had good reasons both for granting pensions and making them non-contributory. About 13,000 of its employes are above 60 years old now and many of them should be retired, but under union rules it is difficult to discharge an employe except for obvious inefficiency, which always is hard to establish without costly and troublesome hearings. Also, the "human engineering" factor is involved, a phase of labor relations which Henry Ford II actively promotes.

(*Turn to page* 64, *please*)



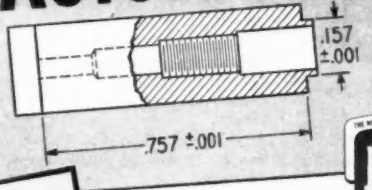
Pick-off arm transfers piece from sixth spindle to milling cutter. Piece is then ejected into chute.

ACTUAL SIZE

770 COMPLETE PIECES AN HOUR

Formed, drilled, tapped and milled on a Model 60

New Britain Automatic



Pick-off and transfer to milling attachment in sixth position makes it possible to drop off this complete piece in one operation, thereby holding down the cost of a highly competitive assembly. Because of the quantity involved, the close tolerances and the size of the piece, a second operation is out of the question.

Special machine performance on a general purpose machine with rigidity and accessibility means double protection of your machine tool investment.

Would you like to see other types of work done on this and other New Britains? Send for *"It Can Be Done"* . . . a fact packed portfolio of actual cost histories and money-making production methods.

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

Despite the general criticism on the non-contributory principle, the company makes a pretty fair case for it. For one thing, it puts control of the fund in company hands. Also, with no vesting involved, it eliminates voluminous clerical work to keep records of employe contributions and calculate what is owing when a worker leaves the company. Another factor that may have influenced the decision is that employes now contribute heavily to both the hospitalization and group life programs, leaving the bulk of the 10-cent settlement for pensions.

Another view on pensions in general is that they constitute just one more fixed cost that makes the break-even point higher and narrows profit margins, making the possibility of losses greater. Also, in whatever guise, pensions comprise a fourth round wage increase, which every one had hoped would be avoided. Whether higher prices for cars and trucks will result is not known, but since the plan does not go into effect until next year, March, it should not have any effect on labor costs until then. It may, however, forestall planned price reductions and in any event hold prices higher than they would have been without the increase in direct labor costs. If pensions spread to suppliers, however, costs will increase all along the line.

An important development since the Ford plan was adopted has been the action in the House of Representatives to increase coverage and benefits under Federal Social Security. The Senate is expected to act on the measure early next year, so that by the time the Ford agreement goes into effect, the company's share of monthly benefits may be reduced. As passed by the House, benefits are increased by 70 per cent in some cases. It is believed that the pension movement this year was instrumental in breaking the logjam that had been holding up increased benefits, which have been expected for some time. Contributions by both employers and workers also would be increased. Whether or not that development will affect pension talks between the union and other companies remains to be seen.

One of the problems expected to arise if pensions become general throughout the automobile industry is transfer of rights from company to company. Like seniority ratings, pension rights tend to freeze an indvidual to his job, since he loses both when he moves to another employer. It does not appear likely that employers would voluntarily approve transferable rights, because one of the reasons for granting pensions is to make for a more stable labor force. Also it would require action dangerously close to industry-wide bargaining, which is opposed in principle.

Personals

(*Continued from page 50*)

Morton C. Meyers, Asst. Sales Manager, has been announced.

Saginaw Industries Co. — Announcement of the appointment of **Marvin J. Alef** as Executive Vice-President has been announced.

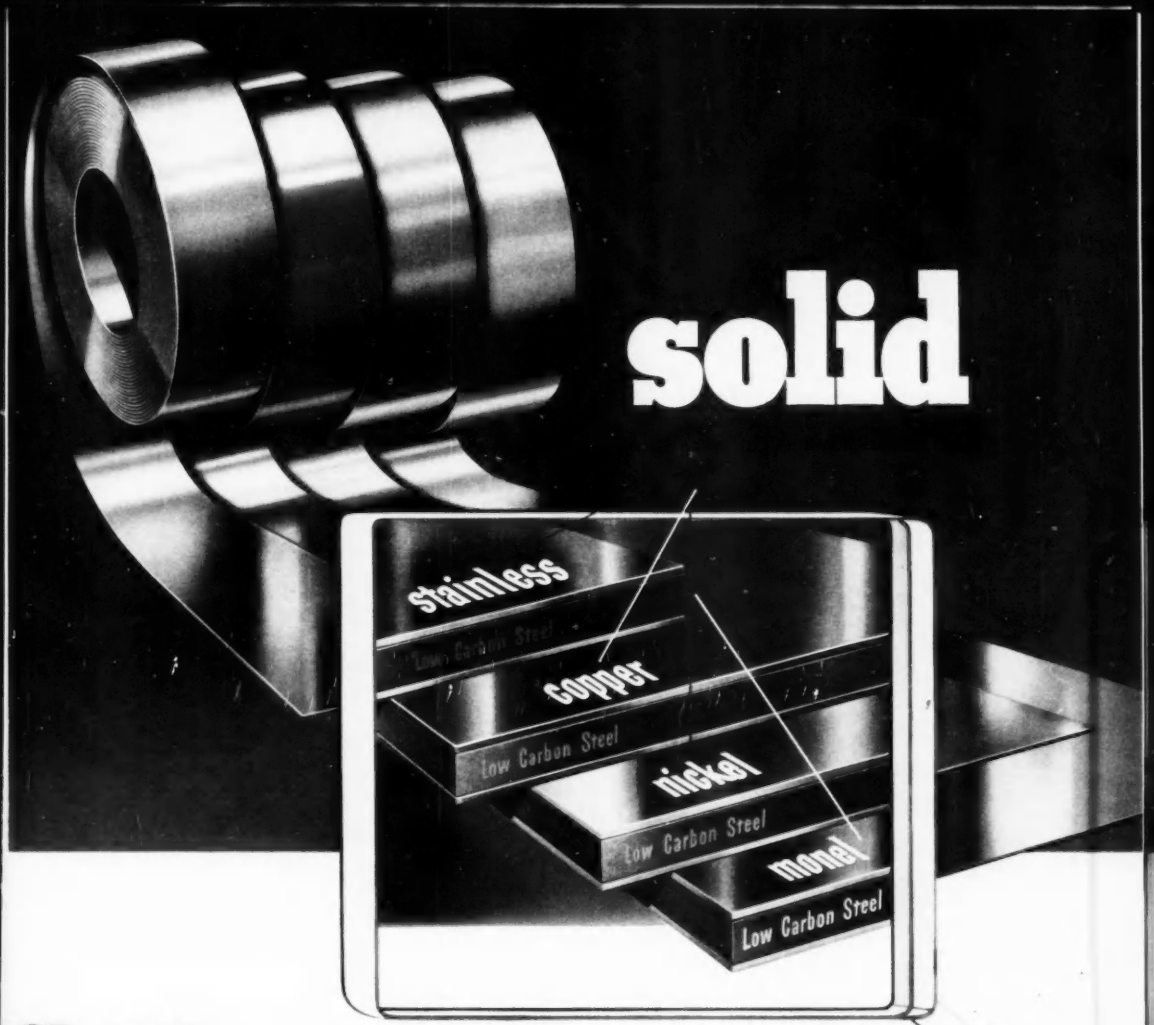
The B. F. Goodrich Co.—**Kermit R. Sadler** has been appointed General Traffic Manager, with headquarters in Akron, O.

Aviation Maintenance Corp. — Three new members have been elected to the board of directors; **Warren Crowell, Walter S. Leschander** and **Fritz Huntsinger.**

The Falcon Tool Co.—**Leroy S. Rawson** has been appointed General Sales Manager.

Unistrut Products Co. — **Spencer R. Griffiths** has been made Asst. Sales Manager.

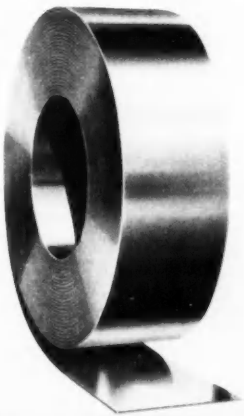
Electra Mfg. Co.—Announcement has been made of the election of **Gordon Groth** to the position of President and General Manager. He will also serve on the Board of Directors.



SuVeneer®

CLAD METALS

Give you high-performance surfaces with economy inside . . . for a world of profitable product fabrication!



You get the *solid* metal surface of your choice when you specify SuVENEER CLAD METAL . . . dense, non-porous, non-peeling, impermeable . . . bonded inseparably to a core of low carbon strip steel. You enjoy economy of purchase, while assuring performance values for your products inherent in the cladding metal you select. ● Quality-produced SuVeneer Clad Metals are available in easy-handling coils, precise in every specification. *Write us on your requirements.*

Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

TOWMOTOR Electric Pallet Truck

selected by ***WRIGLEY***
for speed . . . maneuverability . . . ruggedness

When you're producing millions of sticks of chewing gum ***every day*** — billions every year — you are faced with the gigantic task of unloading, storing and transporting a staggering amount of materials. This is the problem at the Wm. Wrigley Jr. Company's giant Chicago plant—the world's largest chewing gum factory.

To help maintain top efficiency in a competitive industry, Wrigley must be constantly alert to new developments in the materials handling field. That's why this leading manufacturer selected Towmotor Electric Pallet Trucks to augment its handling equipment.

One of the gruelling tasks is to transport and store 2400-lb. pallet loads on an inclined floor at the top of a warehouse building. The floor is rough board surface at an 8° angle. Towmotor is the only truck with enough power to handle full loads rapidly over this area!

In actual operation, Towmotor travels ***faster*** under ***heavier*** loads . . . is lighter in weight for its capacity . . . climbs grades more readily . . . makes sharper turns . . stands up under constant daily use.

Check these outstanding Towmotor features:

- **Dual Finger-tip Control—either hand.**
- **Positive Action Brake—vertical and horizontal positions.**
- **Automatic power cut-off when brake is applied.**
- **Rapid lifting of loads up to 4000 lbs.**
- **3 Point Suspension—for smooth travel, easy maneuverability.**

Write for the descriptive folder on Towmotor Electric Pallet Trucks. Learn how Towmotor **M**ass **H**andling methods can cut production costs and save money for you. Towmotor Corporation, Division 45, 1226 East 152nd St., Cleveland 10, Ohio. Representatives in all Principal Cities in U. S. and Canada.

TOWMOTOR
THE ONE-MAN-GANG

FORK LIFT TRUCKS and TRACTORS

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

44 Million Vehicles

(*Continued from page 43*)

istering 2,763,500 vehicles, Ohio fourth with 2,503,900, followed by Texas with 2,489,000 vehicles. In sixth place will be Illinois with 2,411,000 registrations trailed by Michigan, Indiana, New Jersey, Massachusetts, Missouri and Wisconsin in the order named. These twelve states, which are 24.5 per cent of the total states and the District of Columbia, control 59 per cent of the total registrations.

Present indications are that every state will show an increase in 1949 over the registrations of 1948. However, the forecast for the state of Maine predicts such a slight increase over last year, it is quite possible that when final registrations are recorded this state might end the year with a slight decrease from those of 1948.

Without the record breaking production of the vehicle manufacturers in conjunction with the insatiable demand of the American people for passenger cars, these tremendous registrations would not be possible. Even though the present steel and coal strikes will force the vehicle manufacturers to not only curtail output but quite possibly to cease production, more vehicles will have come off the assembly lines by the end of 1949 than during any other year in the history of the automobiles. The previous peak in production was 20 years ago in 1929 when 5,358,420 cars, trucks and buses were manufactured.

Domestic sales (new registrations) of cars and trucks are presently running at the rate of 4,750,000 passenger cars for the year and about 850,000 trucks or a combined total of 5,600,000 vehicles. New registrations of passenger cars during the first 9 months of 1949 indicate a 36 per cent increase over the same period of 1948 while at the same time trucks show a 12 per cent decrease. Since the resumption of production for civilian use in 1945 over 17,000,000 new vehicles have been distributed between the various states.

It is the distribution of these new vehicles among the various states that has brought about some interesting changes in today's state motor vehicle registrations as compared with 1941. At that time each state had a definite proportion of total U. S. registrations, expressed as a per cent of total. Today seventeen states and the district of Columbia show a decline in that percentage ranging from 1 per cent for Ohio to 25 per cent for Delaware. Two states, Indiana and Michigan, have maintained their same relative standing as they had in 1941 and the remaining 29 states show increases varying from 2 per cent to 26 per cent.

It is of further interest to note that with the exception of Pennsylvania, which shows a 5 per cent increase in its share of total U. S. registrations, and Montana, which declined 9 per cent, all of the remaining states which show de-

(*Turn to page 68, please*)

clines or no change in status cover the area from Maine through Delaware and Maryland, the western boundaries of Minnesota, Iowa and Missouri and the northern banks of the Ohio River. Practically all of this area is the heavily industrialized and most densely populated section of the country.

While we know there was a very large exodus of used cars, at least from the East Coast states during the war, we are not prepared in this article to state whether or not that is the reason for those states which show a decline in their relationship to U. S. motor vehicle registrations. Perhaps some of these states have reached the motor vehicle saturation point. Another factor which might have a bearing on this situation, and we believe this to be a very important one, is the tremendous gains made in spendable money income in those states in the South and Southwest areas of the country. Whatever is the reason, the fact is that a change is taking place and a new pattern is being established which should be watched carefully by all vehicle, parts and accessory, tire and tube, and petroleum products manufacturers.

In view of the importance of this shift of vehicle population we are tabulating the complete list of states showing on a percentage basis their change in relation to total 1949 U. S. registrations as compared with 1941.

Arizona	+26	North Dakota	+ 3
Florida	+23	Oklahoma	+ 3
Alabama	+19	Kentucky	+ 2
Mississippi	+19	Nebraska	+ 2
Virginia	+16	Indiana	None
Arkansas	+15	Michigan	None
Nevada	+14	Ohio	— 1
Oregon	+14	Maryland	— 4
New Mexico	+13	Massachusetts	— 4
Utah	+13	Rhode Island	— 5
West Virginia	+10	Iowa	— 7
Louisiana	+ 8	Missouri	— 7
Texas	+ 8	Illinois	— 8
Washington	+ 8	Minnesota	— 8
California	+ 7	Wisconsin	— 8
Georgia	+ 7	Montana	— 9
South Carolina	+ 7	New York	— 9
Tennessee	+ 7	Vermont	—10
Wyoming	+ 7	New Jersey	—11
Colorado	+ 6	Connecticut	—12
Idaho	+ 6	Maine	—12
North Carolina	+ 5	New Hampshire	—14
Pennsylvania	+ 5	Dist. of Col.	—22
South Dakota	+ 5	Delaware	—25
Kansas	+ 3		

CALENDAR

Conventions and Meetings

Chemical Industries Expos., New York City ..... Nov. 28-Dec. 3
Amer. Soc. Mech. Engineers, Annual Mtg., New York ..... Nov. 28-Dec. 2
Society for Experimental Stress Analysis Annual Mtg., New York ..... Nov. 30-Dec. 2
Inst. of Aeronautical Sciences & Amer. Helicopter Soc. Convertible Aircraft Congress, Phila. ..... Dec. 9-10
Nat'l Motor Boat Show, New York City ..... Jan. 8-14
SAE Annual Mtg., Detroit ..... Jan. 9-13
Nat'l Soc. Plastic Engineers' Conference, Cleveland ..... Jan. 11-13
Plant Maintenance Show, Cleveland ..... Jan. 16-19
Nat'l Auto. Dealers Assoc., Atlantic City ..... Feb. 5-8
Nat'l Auto. Access. Mfrs. Assoc. Annual Expos., New York City ..... Feb. 6-10
Pacific Automotive Show, San Francisco ..... Feb. 16-19
Chicago Auto Show, Chicago ..... Feb. 18-26
ASTM Spring Mtg., Pittsburgh ..... Feb. 27-Mar. 3
Amer. Road Builder's Assoc., Cincinnati ..... March 6-9
SAE Passenger Car, Body & Production Mtg., Detroit ..... Mar. 14-16
Geneva Motor Show, Geneva, Switzerland ..... Mar. 16-26
Nat'l Production Expos., Chicago ..... Apr. 4-8
Amer. Soc. Tool Engineers Industrial Expos., Phila. ..... April 10-14
Amer. Society Lubrication Engineers Convention, Detroit ..... April 10-11-12
SAE Aeronautic & Aircraft Eng. Display, New York City ..... April 17-19
Metal Powder Assoc. Annual Metal Powder Show, Detroit ..... April 25-26
3rd Highway Transportation Congress, Washington ..... Apr. 26-27
International Motor Show, Turin, Italy ..... May 4-14
Mid West Automotive Show, Chicago ..... May 11-14
Automotive Engine Rebuilders Assoc. Annual Convention, St. Louis ..... May 18-19
A.S.T.M. Annual Mtg., Atlantic City ..... June 26-30

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Metal Show

(*Continued from page 36*)

ing rate in molten salt appeared to be responsible for this difference.

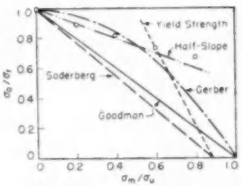
Application of a delayed quenching method indicated the most critical temperature range during quenching of alloy 61S to be 700 to 500 F (370 to 260 C), although the properties were also affected to some extent by the cooling rate at higher and lower temperatures. The properties were improved with increasing rapidity of quench throughout the range from the solution to the precipitation hardening temperatures.

The quench-aging procedure may be of some commercial interest from the standpoint of eliminating the detrimental effects of natural aging between quenching and aging at elevated temperatures.

Effect of Steady Stress on Fatigue Behavior of Aluminum

By **J. A. Sauer**, Pennsylvania State College, and **D. C. Lemmon**, General Electric Co.

THE purpose of this investigation is to study the fatigue behavior of a structural aluminum alloy when subject to the combined action of a steady static stress and a superimposed dynamic stress. All tests were performed with a structural grade of aluminum alloy—Alcoa 14S-T. All fatigue tests



—— Modified Goodman Relation $\sigma_a/\sigma_f + \sigma_m/\sigma_u$
— — Soderberg Straight Line Relation $\sigma_a/\sigma_f + \sigma_m/\sigma_y$
—·— Gerber Hypothesis $\sigma_a/\sigma_f + (\sigma_m/\sigma_u)^2$
—··— Half-Slope Formula $\sigma_a/\sigma_f + \frac{1}{2}(\sigma_m/\sigma_u)$
– – – Yield Strength Line $\sigma_a + \sigma_m = \sigma_y$

Fig. 5 — Steady stress — alternating stress diagram for bending tests.

were carried out on a Sonntag universal fatigue testing machine.

Stresses for all points were determined by use of elastic formulas. Despite this fact, no permanent set was noticeable in any unbroken specimens after completion of the tests.

The effect of added mean stress on the fatigue strength at 10^7 cycles is illustrated in Fig. 5 a steady stress—alternating stress diagram in which the ratio of the fatigue strength for any mean stress to the fatigue strength for complete reversal is plotted against the ratio of the mean stress to the static tensile ultimate strength. For the data obtained, the fatigue strengths appear to linearly decrease as the

(*Turn to page 72, please*)

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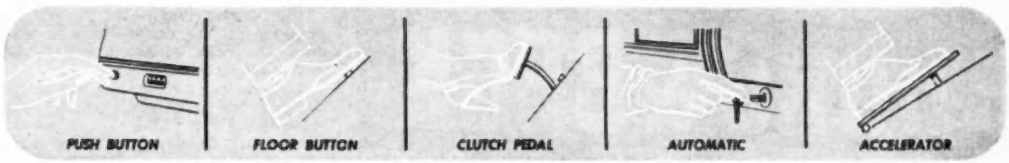

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mean stress increases. The test results can be approximately represented up to the yield strength line by a "half-slope formula."

The effect of mean stress on the torsional fatigue strength is illustrated by the steady stress—alternating stress diagram in Fig. 6. For mean stress—ultimate strength ratios less than 0.2, the fatigue strength seems to be little affected, if at all. The diagram shows that our test data is approximately represented by a line with a slope half that corresponding to the modified Goodman relation or, if the point corresponding to the highest mean stress is disregarded, by the Gerber hypothesis.

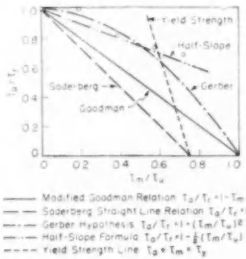

Fig. 6 — Steady stress — alternating stress diagram for torsion tests.

For pure bending or torsional loading, polished specimens of Alcoa 14S-T do not follow either the modified Goodman relation or the Soderberg relation for determining the effect of mean stress on fatigue strength.

The Effect of Alloying Elements on the Transformation Characteristics of Induction-Heated Steels

By Joseph F. Libsch, Wen-Pin Chuang and William J. Murphy,
Lehigh University

A COMPARISON of end quench specimens austenitized in the furnace at 1600 F (870 C) for 40 min and by induction to 1600 F (870 C) for 0 sec at temperature was made for a number of medium carbon steels.

It was found that the transformation characteristics of the plain carbon (AISI 1050) steel is similar, regardless of the heating method, as shown in Fig. 7. The same characteristics are true for the nickel alloy (AISI 2340) and the high manganese-high sulphur (AISI 1144) steels. The small variation shown between furnace-heated and induction-heated specimens may easily be due to the somewhat coarser austenitic

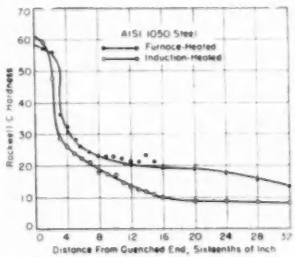

Fig. 7 — Transformation characteristics of AISI 1050 steel.

grain size developed in the furnace-heated specimens.

The transformation characteristics of chromium-molybdenum alloy (AISI 4150) steel, Fig. 8, departs strikingly from that of the same steel heated in the furnace. The chromium-vanadium alloy (AISI 6150) and the chromium-nickel-molybdenum alloy (AISI 4340) steels react in a similar manner.

The difference in behavior of these two groups of medium carbon steels is unquestionably associated with the presence of the carbide-forming elements chromium, vanadium, and molybdenum in the latter group.

The results presented are characteristic of the particular austenitizing cycle used in these experiments. Obviously, different austenitizing conditions will change the exact position of the induction-heating curves. While the general behavior of the alloying elements is demonstrated by these experiments, in practice new data should be obtained for each specific induction

(*Turn to page 76, please*)

Truly compressible gaskets reduce sealing costs on metal-to-metal joints

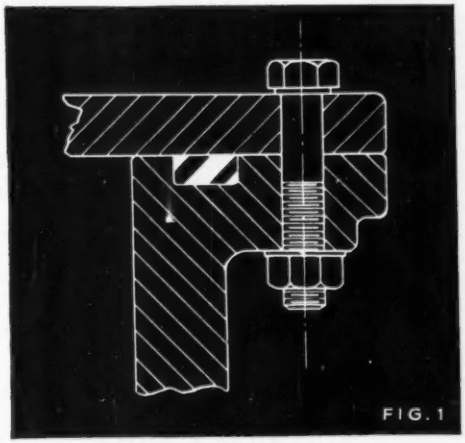
FIG. 1

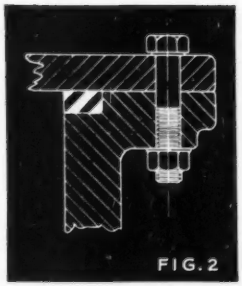
FIG. 2

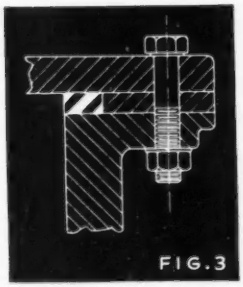
FIG. 3

Sealing costs on rigid, metal-to-metal joints frequently can be reduced with truly compressible gasket materials. Such materials compress under load, actually decreasing in volume. Hence they permit gaskets made to commercial standards to be used on units with extremely close assembly tolerances.

On the flange shown in figure 1, for example, sealing costs were reduced when its molded rubber gasket was replaced with a lathe-cut ring made of a truly compressible Armstrong's Cork-and-Rubber Composition.

Unless close tolerances were maintained, the rubber gasket tended to overflow its channel and interfere with correct mating of the flanges. Cork-and-rubber, on the other hand, compressed into the channel without extrusion. And because cork-and-rubber was lathe-cut instead of being molded, its cost was much less.

Similarly in figure 2, lathe-cut rings of Armstrong's Cork-and-Rubber replaced a rubber gasket and provided an effective, low-cost seal. Here again, tolerances on the rubber gasket had caused trouble. Undersize gaskets tended to creep out of place.

To solve this problem, cork-and-rubber rings were supplied 25% thicker than the depth of the counterbore. Because cork-and-rubber is truly compressible, it compressed without appreciable side flow and eliminated the tendency to creep.

Figure 3 shows how flat flanges were adapted to metal-to-metal sealing by inserting an annular shim between the flanges. As before, the lathe-cut cork-and-rubber gasket reduced sealing costs.

Effective, low-cost seals for units with close assembly tolerances is but one type of problem solved by Armstrong's Cork-and-Rubber. Call your Armstrong representative to see how these materials can help you.

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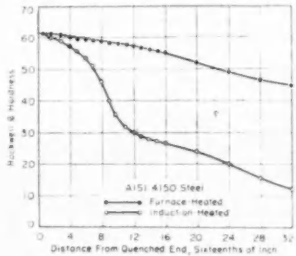

Fig. 8—Transformation characteristics of AISI 4150 steel.

heating cycle. Thus end-quenched specimens appear suitable in evaluating the effect of alloys on the transformation characteristics of steels heated by induction.

Welding Zinc Base Alloy Die Castings

By Roland H. Ogden,
Alladin Rod and Flux Mfg. Co.

THAT the idea is still prevalent among welders that white metal or, more properly, zinc base alloy cannot be welded is not too surprising. When one considers the dearth of information in the literature there can be no doubt about why the technique of making satisfactory welds in diecast material is practiced to such a limited extent.

Before a successful weld can be made in any material some knowledge must be obtained concerning the composition of the base metal and of the welding rod that is to be used. The three zinc base alloys shown in Table 1 find widespread use at the present time with numbers 2 and 3 having the greatest use and No. 1 alloy finding use for special purposes and to a lim-

TABLE 1

	Alloy No. 1	Alloy No. 2	Alloy No. 3
Commonly used domestic and foreign names	Zamak 2 A.S.T.M. XXI S.A.E. 921 Mazak 2 Gomak 2 GM-4128-M	Zamak 3 A.S.T.M. XXIII S.A.E. 903 Mazak 3 Gomak 3 GM-4130-M QQ-Z-363	Zamak 5 A.S.T.M. XXV S.A.E. 925 Mazak 5 Gomak 5 GM-4129-M QQ-Z-363
	Composition, %		
Aluminum	3.5 4.5	3.5 4.3	3.5 4.3
Copper	2.5 3.5	0.10 max.	0.75 1.25
Magnesium	0.02 0.10	0.03 0.08	0.03 0.08
Tin	0.005 max.	0.005 max.	0.005 max.
Lead	0.007 max.	0.007 max.	0.007 max.
Iron	0.100 max.	0.100 max.	0.100 max.
Cadmium	0.005 max.	0.005 max.	0.005 max.
Nickel	0.050 max.	0.050 max.	0.050 max.
Pb-Cd-Sn	0.010 max.	0.010 max.	0.010 max.
Zinc	Remainder	Remainder	Remainder

ited extent. The composition of a well-known welding rod used in the welding of zinc base alloy die castings is shown in Table 2. Experience shows that certain advantages are to be obtained by

the use of this ternary alloy. Due to the liquidus temperature of these alloys, however, extreme care must be exercised in the actual welding operation.

Clean the metal around the failure very carefully, removing any plating, paint, or grease. Vee out the metal to an included angle of approximately 45 deg where the weld metal is to be deposited. Careful attention should be paid to the adjustment of the blowpipe flame. A soft hazy flame is best for successful welds. Because of the relatively poor conductivity of the base metal rather good control of the weld zone temperature may be exercised by proper manipulation of the flame. The welding rod should be applied in such a manner as to facilitate the flow of metal under the oxide film, since the oxide must be prevented from being stirred into the weld zone. Scrap material is wholly unsuitable for use as filler rods in the welding of white metal and its use can only result in an inferior weld.

TABLE 2

Element	Composition, %
Aluminum	4.15
Copper	2.97
Magnesium	0.045
Tin	0.001
Lead	0.002
Iron	0.045
Cadmium	0.002
Antimony	Nil
Zinc	Remainder

Applications for Helium in Inert-Arc Welding

By M. J. Conway,
General Electric Co.

THE widest use of helium today is in inert-arc welding of stainless steels. There are several good reasons: When used with a d-c, straight-polarity source of welding power, welding speeds increase as much as 40 per cent when helium is substituted for argon. This speed is as much as 50 per cent greater than when argon is used with an a-c welding power source.

With helium the arc voltage per given arc length is at least 40 per cent greater than with argon. Therefore, the wattage, or heat, in the arc is that much greater. Since the speed of welding is a function of the rate of heat input to the work, it follows that the hotter arc attained with helium produces faster welding. Only where the work is too thin or too small to take the higher heat of helium is the use of argon and direct current preferable for inert-arc welding of stainless steels.

Other advantages accrue with the higher welding speed when helium is used. Distortion is reduced both directly because of the increased welding speed and also because of the reduction in width of the heat-affected zone and the weld bead itself. The narrower weld bead and heat-affected zone plus the faster fusion and chilling rates, decrease carbide precipitation and other undesirable metallurgical changes.

The use of reverse-polarity d-c to reduce heat input for small or thin work has, unfortunately, proved impractical. The notable exception is magnesium, which welds nicely with helium and reverse-polarity d-c.

The work done to date in using helium with an a-c source to weld stainless steel has given inconclusive results.

Inconel and Monel are also often welded with helium and d-c straight polarity. Welding conditions and comments are similar to those for stainless steel. The only additional point worthy of attention is the fact that X-ray quality welds can be made in Inconel and Monel with the inert-arc process. This remains true whether or not filler metal is added.

Body Engineers See New Developments

THE annual meeting of the American Society of Body Engineers, held in Detroit on Nov. 2, 3, and 4, was distinguished by a technical program of timely interest which was presented to a large audience interested in body design and production. A trio of well known stylists—Carl Sundberg, Brooks Stevens, and Don Mortrude—discussed

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½	.083	14	.022	24
⅝	.095	13	.022	24
¾	.095	13	.022	24
⅞	.095	13	.022	24
1	.095	13	.028	22
1⅛	.095	13	.028	22
1¼	.095	13	.028	22
1⅜	.095	13	.028	22
1½	.095	13	.035	20
1⅝	.120	11	.035	20
1¾	.120	11	.035	20
1⅞	.120	11	.035	20
2	.148	9	.035	20
2⅛	.148	9	.035	20
2¼	.148	9	.035	20
2⅜	.120	11	.035	20
2½	.148	9	.035	20
2⅝	.120	11	.035	20
2¾	.148	9	.035	20
2⅞	.148	9	.049	18
3	.148	9	.049	18
3⅛	.148	9	.049	18
3¼	.148	9	.049	18
3⅜	.148	9	.049	18
3½	.148	9	.049	18
3⅝	.148	9	.065	16
3¾	.148	9	.065	16
3⅞	.148	9	.065	16
4	.148	9	.065	16

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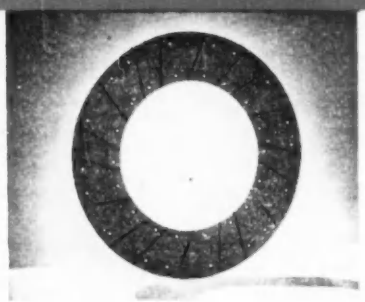

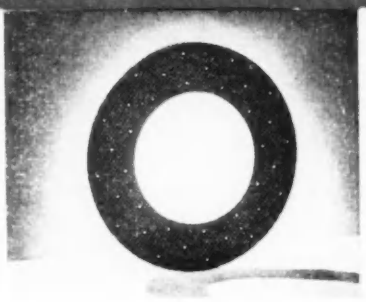

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VEE-LOK To keep clutch facings intact despite tremendous centrifugal force at high speeds, R/M developed VEE-LOK . . . a patented, locked-together, endless construction of V-shaped asbestos fabric, fully impregnated, compressed, heat-cured and ground to precision accuracy. The most widely used clutch facing in America today for original equipment, VEE-LOK offers greater spinning strength . . . greater efficiency in high speed clutches . . . more uniform wearing characteristics. Available for every automotive use.

SEMI-METALLIC Many heavy-duty applications require a facing that operates against steel and stands up under severe wear. R/M solved the problem with Semi-Metallic. This facing, compounded of asbestos and powdered metal, is bonded with a synthetic resin. Light in weight, it has heavy-duty stamina. It both conducts and dissipates heat. It will run wet (in oil) or dry with equal facility. It wears longer; the copper film it deposits forms a veneer which serves to resist abrasion as well as to dissipate heat.

RAYBESTOS - MANHATTAN, INC.

EQUIPMENT SALES DIVISION **620 Fisher Bldg., Detroit 2, Mich.**

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1071 Union Commerce Bldg., Cleveland 14, Ohio

Factories: Bridgeport, Conn. Manheim, Pa. Passaic, N. J. N. Charleston, S. C.

Do you have a problem in clutch design . . . or in supply of clutch facings or materials?

Call in your R/M representative!

Take advantage of the advice and assistance of the company that's "first in friction materials" . . . for clutch facings as well as for brake linings.

Get the benefit of the pooled experience of four great R/M plants . . . each with its own engineering department, its own pilot plant, its own facilities for laboratory and road-testing.

Count on the kind of cooperation that the automotive industry has always received from R/M . . . in developments ranging from the *first* woven clutch facing through the latest improvements in oil-immersed clutches, and in band-type and disc-type automatic clutches.

Remember . . . when it comes to friction materials or automotive rubber products, consult your R/M field engineer, or write direct to headquarters. Please make your inquiry as specific as possible.

we'll face it for you!

R/M

FIRST IN FRICTION

RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Mechanical Rubber Products • Rubber Covered Equipment • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

present motor car styling at the opening session. There was unanimity of opinion as to the need for distinctiveness of line and the desirability of impelling the car owner to buy yearly through the inducement of important charges in style.

Papers on small cars were presented by Arthur Cox of Crosley Motors, Inc., and William Flajole, a Detroit stylist. Mr. Flajole gave an analysis of the need for a small, low priced car in terms of current economics. Altogether there were eight technical sessions which, besides styling and small cars, included such topics as: body materials, production engineering, commercial bodies, and passenger car bodies.

One of the attractions of the meeting was a compact but highly instructive group of 30 exhibits at the Rackham building. Among these were some new developments well worth noting. Libbey-Owens-Ford Glass Co. demonstrated its new E-Z-Eye safety glass that is tinted a restful blue-green. It is said to reduce the effect of ultraviolet rays, reduce glare, and reduce heat from the sun's rays. The relative light and energy transmitting properties of E-Z-Eye glass and standard glass of 0.25 in. thickness are as follows:

	E-Z-Eye Safety Plate	Standard Safety Plate
Illuminant A ..... (Tungsten Filament)	72-74%	87.5-88.5%
Illuminant C .... (Average Daylight)	74-76%	87.5-89.5%
Ultraviolet	48-44%	73-63%
Infrared	35-29%	77-73%
Total Radiation .	48-52%	78-82%

Anderson Co., of Gary, Ind., one of the major producers of windshield wiper arms and blades, exhibited a new vacuum type windshield motor that features a simple linkage hook-up to the two wiper arms.

The exhibit of Owens-Corning Fiberglas drew attention to a new line of vinyl coated fabrics woven of Fiberglas yarns. These fabrics are said to produce a handsome top covering, with a choice of five colors, having unusual durability. The material is made by the Cordo Chemical Co., Norwalk, Conn.

A molded plastic material, displayed by Woodall Industries, Inc., may be applied in the form of garnish moldings, scuff plates, and complete door trim panels. For the latter use, they showed molded trim panels having the arm rest as part of the panel.

Another item of interest to truck and bus manufacturers and operators is an advanced model of the Air-Push windshield wiper produced by Sprague Devices, Inc., Michigan City, Ind. It is a compact unit having only four moving parts. With 11 psi, it will move a 21-in. arm and 13-in. blade.

Transfer Machine Problems Analyzed

THE first public report—with a definite stamp of approval—on transfer machines was given by representatives

reaching for the stars . . .

Almost beyond the imagination . . . yet well within the realm of possibility, lie the developments and ambitions of our modern aviation industry: Men and planes going faster than sound; aircraft for the exploration of the universe; hangars, airfields, navigation aids suspended in space — things beyond belief.

And as requirements for superplanes grow . . . [illegible], in cooperative progress with the Aircraft Industry, will continue to design and manufacture ball and roller bearings to withstand the terrific temperatures and speeds these new developments demand. [illegible] Industries, Inc., Philadelphia 32, Pa. 6372

Aviation bearings engineered by SKF

a treasure house of science for engineers

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2. Constant Temperature Room
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7. Microscopy Laboratory
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11. New Products Laboratory
12. New Products Pilot Plant
13. New Products Evaluation Lab.
14. Adhesion Laboratory
15. Pilot Plating Plant
16. Physical Testing Laboratory
17. Experimental Compounding and Mill Room
18. Product Engineering Drafting Room
19. Specifications Work Shop
20. Product Engineering Office
21. Dark Room
22. Metallographic Laboratory

this is your new rubber laboratory

In the U. S. Rubber Fort Wayne plant is a new laboratory which you can use to work out your problems

involving rubber-bonded-to-metal parts and all-rubber products, too. You will find here the newest and finest equipment and a staff of chemists, physicists, metallurgists, and design engineers

with great experience in reducing vibration, noise and wear in automobiles and trucks, and all other mechanical equipment with moving parts.

To explore the possibilities of this treasure house of science

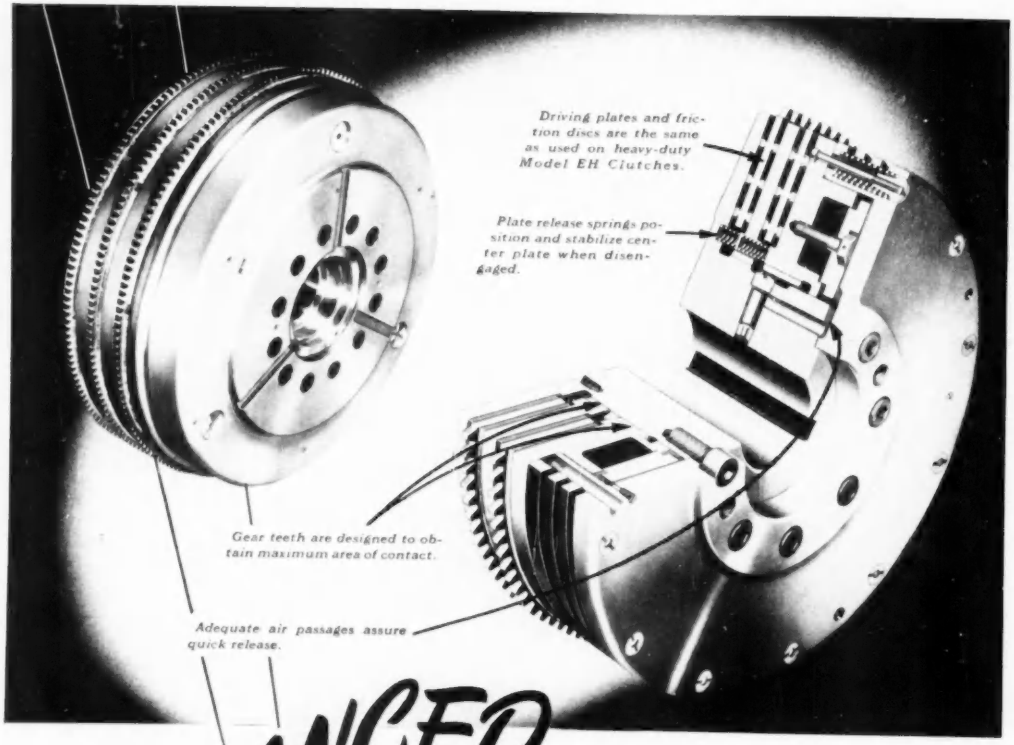
call or write
Engineered Rubber
Products Division

U.S.RUBBER
SERVING THROUGH SCIENCE

[*New Square Span Reading of Texas A & M College . . . Reported in July Reader's Digest*]

UNITED STATES RUBBER COMPANY

Fort Wayne, Indiana, or 5850 Cass Avenue, Detroit, Michigan



BALANCED ...for work, wear, heat

Experience has proved the mechanical proportions of the Twin Disc Models P and PH Air-actuated Clutches to be in proper balance for efficient work, for long wear-life, and to absorb and dissipate heat . . . essential qualities in heavy-duty clutch installations.

Twin Disc Air-actuated Clutches also permit operation by remote control without complicated linkage systems. They require less shaft space, thereby permitting closer shaft bearing center distances. Gear teeth are designed to obtain maximum area of contact. Multiple springs assure quick release and equal distribution of release pressure. Properly installed, these Clutches require no adjustments to maintain the correct pressure on the friction discs . . . an important factor in obtaining longer wear-life. Model P and PH Clutches are available in sizes from 14 to 42", capacities from 75 up to 1325 hp.

If you have a heavy-duty clutch application requiring operation by remote control, write the Twin Disc Clutch Company for their engineers' recommendations. Ask for Bulletin No. 139-A. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U. S. PAT. OFF.

SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

of Buick, Oldsmobile, Packard, and Reo at a panel meeting of the Detroit Section, SAE last month. The consensus was that direct labor costs with transfer machines have been reduced to as low as 15 to 20 per cent as compared with the cost of manning conventional prewar machinery. In addition, quality has been improved and more uniformity is expected since work does not have to be moved from one fixture to another in different machines. On the other hand, it is obvious that further advances are required in machine design to reduce maintenance costs. Considering the sharp reduction in direct labor cost, it is only natural to expect that indirect burden would increase percentage-wise. But the ratio of indirect to direct labor has jumped appreciably with the operation of some transfer machines. Users of transfer machines have attacked this problem in many ways. Several of the companies have made it a point to set up schools for maintenance men so as to acquaint them with hydraulic and electrical systems. In some instances maintenance men have lived at the machine tool plant during the final stages of machine assembly to observe how the equipment is put together. At the same time, with production experience, machine tool builders are taking steps to make controls and hydraulic and electrical systems more accessible and easier to service or replace.

R. T. Hurley, formerly of Ford and now president of Curtiss-Wright, cited some dramatic investigations now underway in the field of metal cutting. Machining of cast iron can be greatly improved by adopting a short time, low temperature anneal to transform the structure by removing much of the free carbides, thus speeding chip removal and making possible an extraordinary increase in speeds and feeds. The same is true of steel forgings. At Ford the problem has been met by the salt bath anneal technique now in use at Canton Forge. It eliminates free carbides and makes the parts more easily machinable.

A new order of economy in chip removal is promised by the development of machine tools capable of extremely high spindle speeds—up to 6000 rpm—in machining annealed castings and forgings. Such equipment will have greatly increased power and rigidity, particularly in tool holders, according to Mr. Hurley.

Current experimental work indicates that such machines will require dynamic balance of rotating parts and strain gage analysis of tool holders and beds to provide for freedom from even minute vibration. With such equipment and under controlled conditions, chip removal becomes less sensitive to variations in grade of cemented-carbides and will tolerate simple cutting fluids. Even now Mr. Hurley believes that variability in cemented-carbide tools is manmade, resulting more from variations in grinding and dressing than from any shortcomings of the basic material.

Iron Ring Lands Bonded to Aluminum Pistons

(*Continued from page 30*)

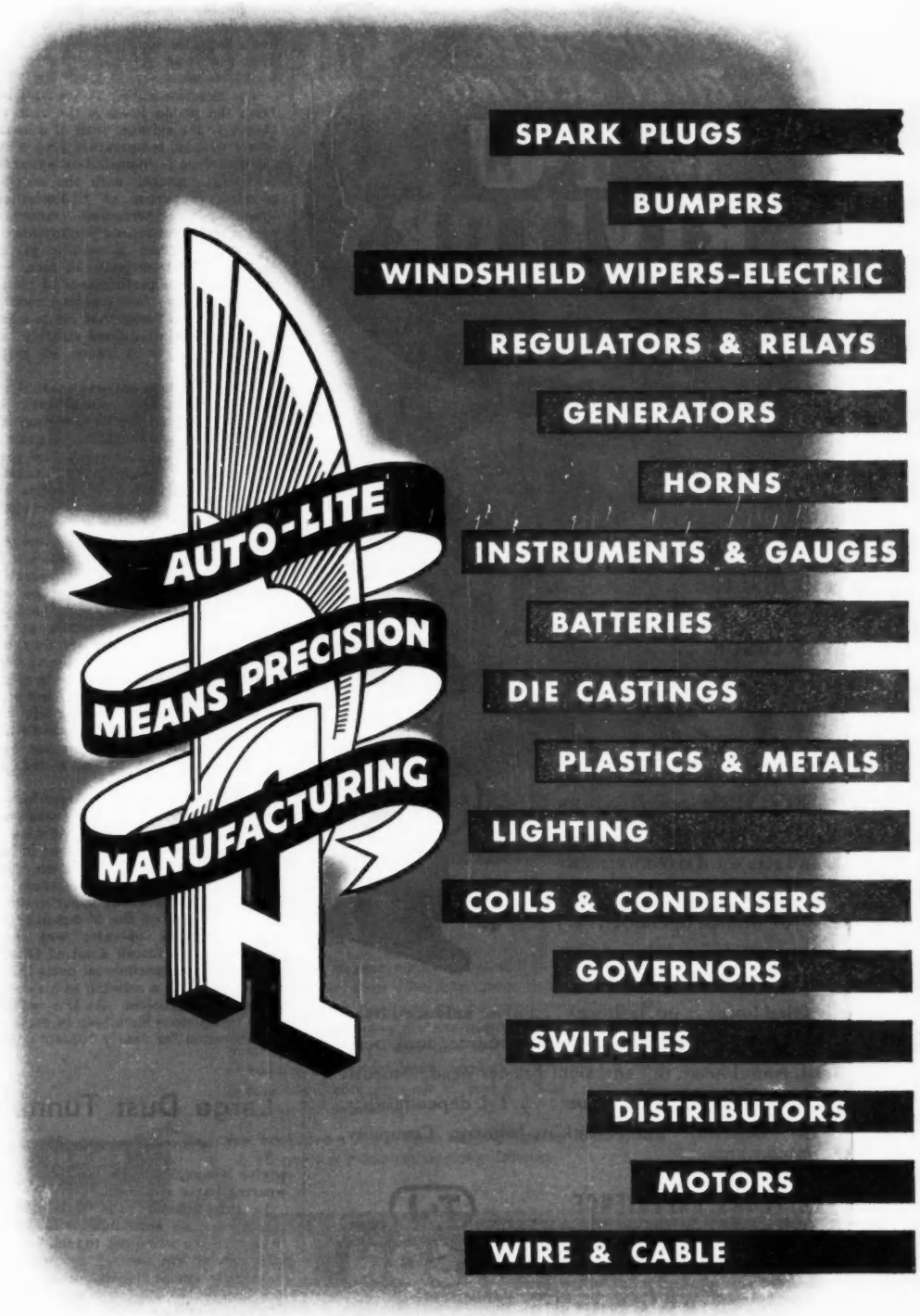
bonded, nor have any of them been fully successful.

With the advent of the Al-Fin process of molecularly bonding aluminum and its alloys to iron and iron to alloys a method was presented for the satisfactory solution of the problem of a bimetallic piston. Realizing this, the United Engine and Machine Co. of San Leandro, Calif., manufacturers of Silv-O-Lite aluminum alloy pistons, acquired the right to use the patented Al-Fin process for the manufacture of such a piston. These pistons are being marketed under the trade name Dualoy and are available as original equipment and replacement pistons for both gasoline and Diesel engines for truck, buses, tractors and other heavy duty industrial engines.

Under the Al-Fin process, developed by the Fairchild Engine & Aircraft Corp., aluminum is cast about a ferrous metal part which has been tinned with a coating of ferro-aluminum alloy so that the aluminum fuses with the alloy to present a continuous metal phase between the dissimilar metals without the mechanical separation which has heretofore characterized previous attempts to cast aluminum around ferrous articles. The ferro-aluminum alloy obtained in the bond is strong and extremely hard and brittle. It shows a tensile strength of from 10,000 to 17,000 psi and a shear strength of 6000 to 8000 psi. By keeping the bond thickness to a minimum, less than 0.002 in., no measurable temperature drop can be detected across the interface.

The production of piston casting under the Al-Fin process used by the United Engine & Machine Co. is accomplished in four steps; cleaning the Ni-Resist iron insert, tinning the insert, casting, and heat treating. The Ni-Resist iron rings are cleaned by sand blasting. Although chemically clean surface is not necessary, the rings should be free from all scale and grease, and for that reason they are not touched by hand once they have been cleaned. After cleaning, the ring is immersed in a bath of molten aluminum for several minutes where the aluminum attacks the iron and forms an iron-aluminum alloy on the surface of the ring. In appearance the ring is now wet or tinned, much as solder will wet the copper soldering iron, and while hot this coat cannot be removed by scraping. The thickness of the bond will depend on the length of time the ring is immersed in the tinning bath. When removed from the tinning bath the ring is inserted quickly in the permanent mold, and the aluminum is poured in time to submerge the ring before the coating can solidify. This timing of the pour and the handling of the ring to prevent oxidation required the development of a special foundry technique which plays a large part in the successful production of these castings. Because the strength of the bond exceeds the thermal stresses due to the slight difference in the thermal expansion of Ni-Resist and aluminum, it is possible to heat treat these pistons to produce the highest mechanical properties.

The cast iron ring inserts used are made of type 1A Ni-Resist (15 per cent Ni 6 per cent Cu). This material has marked advantages over all other materials considered. The factor which contributed most to its selection was its high coefficient of thermal expansion which very closely approximates that of the aluminum alloys used. However, other very important advantages which it possesses are its strength, high resistance to galling and metal-to-metal wear because of the graphite particles


AUTO-LITE
MEANS PRECISION
MANUFACTURING
SPARK PLUGS
BUMPERS
WINDSHIELD WIPERS-ELECTRIC
REGULATORS & RELAYS
GENERATORS
HORNS
INSTRUMENTS & GAUGES
BATTERIES
DIE CASTINGS
PLASTICS & METALS
LIGHTING
COILS & CONDENSERS
GOVERNORS
SWITCHES
DISTRIBUTORS
MOTORS
WIRE & CABLE

distributed throughout its structure, its much greater toughness and impact resistance, its high capacity to dampen vibration, and of course its superior heat resistance.

The superior ability to transfer heat from the piston head to the ring and thence to the cylinder wall of a bonded insert with no temperature drop across the interface is immediately apparent; and this, together with the excellent physical properties of Ni-Resist outlined in the preceding paragraph, points to the increased performance to be expected from bi-metallic pistons. These expectations have, in fact, been born out by the performance of pistons on test for the last eighteen months, for it has been found that the bi-metallic piston has eliminated entirely ring groove wear as a cause of piston failure.

When it became apparent that it was feasible to produce commercially the bi-metalic piston, the United Engine & Machine Co, inaugurated a program of testing aimed at disclosing the practicability of the design. Test installations were made in both gasoline and Diesel engines in several large trucks operating over the Denver to San Francisco run. A major bus company also cooperated in testing these pistons by installing them in buses operating between San Francisco and Los Angeles. As a matter of policy, all pistons on test were inspected at the 50,000 mile mark. Because they displayed no evidence of ring groove wear or piston head erosion, they were all reinstalled after this inspection and were still operating when this article was written. Not one case of piston failure due to top ring groove wear has been experienced in any of the pistons on test.

In one particular supercharged Diesel engine the ring groove wear was so severe as to require installation of two sets of conventional pistons in less than 25,000 miles of operation. Because of the severity of this operation it afforded an excellent opportunity to test the theory of the bi-metallic piston. The truck operator was more than willing to install a set of Dualoy pistons on an experimental basis in the hopes of finding a solution to his costly maintenance problem. At this writing these test pistons have been in continuous operation for nearly 103,000 miles!

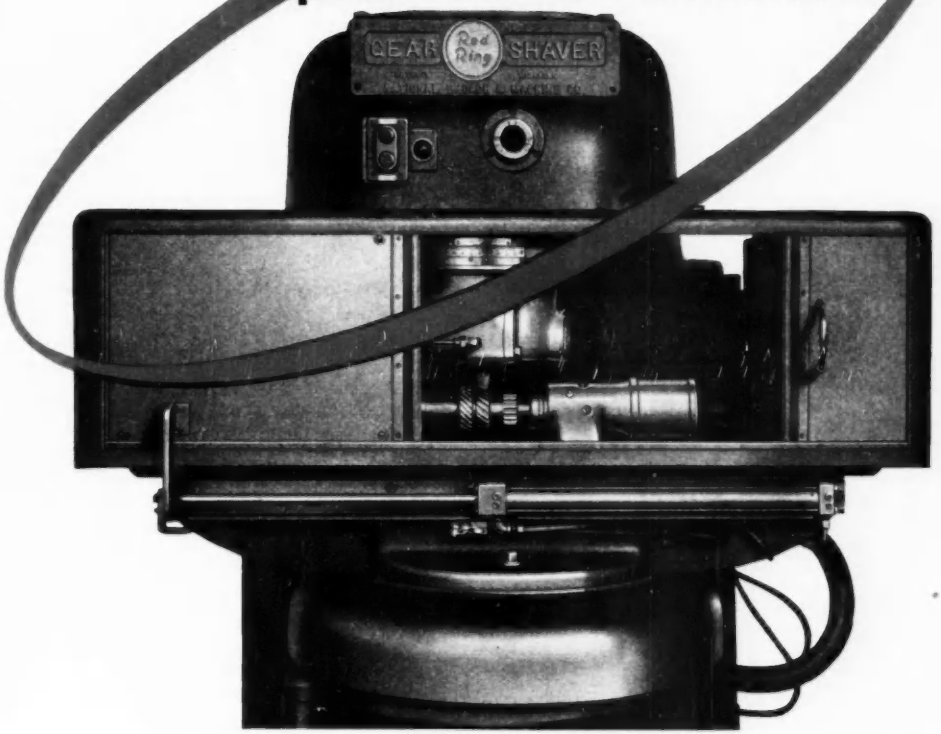
Large Dust Tunnel

(*Continued from page* 33)

engine is completely dismantled and all wearing parts measured.

In this manner road tests lasting months can be simulated in hours or days with the new dust tunnel. Accurate results are insured by precision measuring devices, instruments, absolute filters, and other equipment which will help engineers obtain the facts on dust damage.

SEMI-AUTOMATIC operation speeds GEAR SHAVING



Two new Red Ring developments make it practicable to put gear shaving on a semi-automatic basis and increase production rates substantially.

These are the air operated tailstock and the air operated, electrically controlled automatic splash doors. The former clamps the work gear quickly and accurately in shaving position. After loading the operator presses a start button which automatically closes the splash doors, starts the flow of coolant and the automatic shaving cycle. When this cycle is completed, coolant is cut off and the doors open automatically for unloading.

For small gears, this reduces loading time up to 50% and on all gears it minimizes operator fatigue.

Write for details and quotations.

SPUR AND HELICAL
GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORM

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN • • • • • • • • • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

NEW PRODUCTION AND PLANT EQUIPMENT

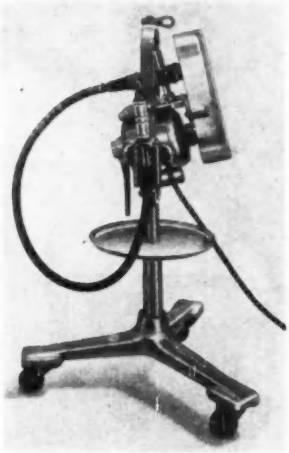
For additional information please use coupon on page 54

(*Continued from page 46*)

of work where burring, filing, sanding, grinding, wire brushing or polishing is required.

The new model is made with 16 constant shaft speeds, available in two standard speed ranges. One range has speeds of 1000, 2500, 4250, and 6000 rpm; the other, speeds of 2000, 5000, 8500, and 12000 rpm. Different speed combinations within each standard speed range may be obtained by shifting the single sheaves of the jackshaft pulleys. Changes are made by loosening two hand clamps for belt shifts, and using a standard wrench supplied with the machine for sheave rearrangement.

Power to the cable is transmitted without whip, affording smooth operation without cramping or binding. The jackshaft spindle of this "series M" Kellerflex mounted on ball bearings, transfers its drive directly to a piloted cable without use of an eccentric. Entire unit is balanced in an all-steel yoke, swings through an ample vertical arc, and has a 360 deg horizontal motion. This insures the unit following the shaft combination in all positions.



Pratt & Whitney "Series M" multiple speed Kellerflex flexible shaft machine

"Series M" Kellerflex may be assembled without tools or special adapters to bench stands and roller floor stands, or may be suspended by eyebolt or cable loop for permanent location. It can also be assembled to a trolley mounting on an I-beam.

All fittings are standard for P&W attachments and handpieces, available in various styles, types and sizes.

E-81—Weld Equipment For Stainless Steel

The Aircomatic Process of the Air Reduction Sales Co., New York, N. Y.—an inert gas-shielded, metal arc method of welding, featuring a continuous feeding of filler metal in wire form through the barrel of a manually operated gun—has been adapted to the welding of chrome nickel or stainless steel and aluminum bronzes. According to Airco, it is possible to weld stainless steel in all standard joint designs, in thickness of $\frac{1}{8}$ in., plus, at speeds faster than those possible with any other welding method. High speed continuous deposition of filter metal is possible in all positions with a completely visible arc. Both manual and automatic equipment are available.

When applied to the welding of stainless, this process is declared to have certain specific advantages over the older and better known methods. For example, the filler metal is carried across the arc and deposited in the weld virtually without loss of alloying elements.

(*Turn to page 96, please*)

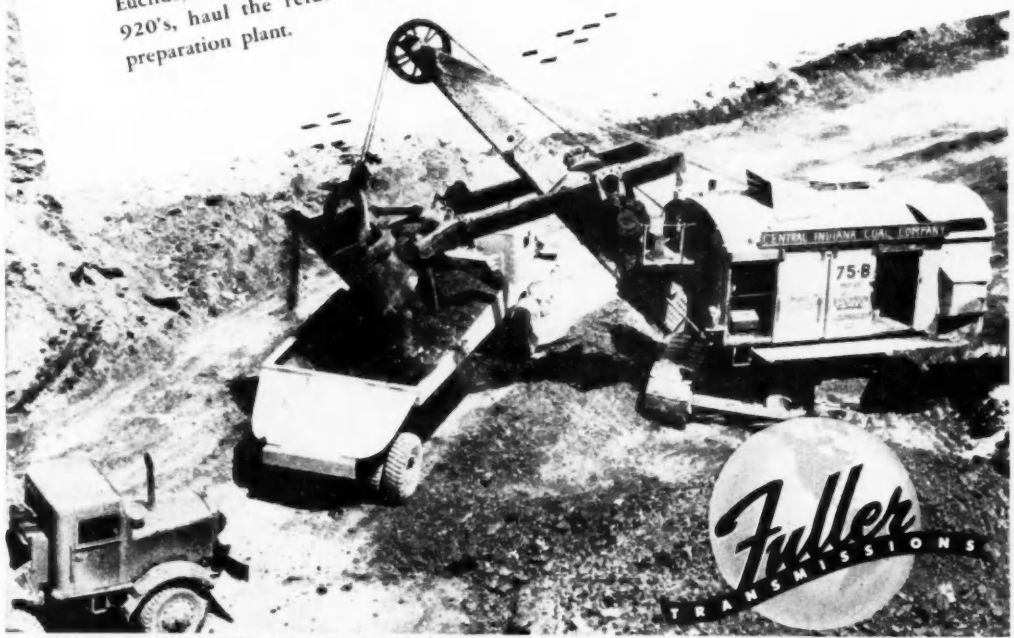
"Best Transmission we ever had..."

So says Pierce Wright, head mechanic at Central Indiana Coal Company's Maid Marian Mine, Odon, Indiana.

Mr. Wright's words of wisdom refer to Fuller 5-A-920 Transmissions in five of Maid Marian's eight Fuller-equipped 25-ton Euclid bottom dump trucks hauling raw coal from the pit to the tipple . . . an average of 17 to 18 round trips per seven-hour day. Two additional 15-ton rear dump Euclids, also equipped with Model 5-A-920's, haul the refuse away from the preparation plant.

Five forward speeds, an overdrive in fifth, and one reverse are provided by the Fuller's Model 5-A-920, which is designed for straight and tractor-type trucks utilizing engines up to 920 inches. The application of either two or three-speed Fuller auxiliaries provides the widest opportunity for transmission of power, gear splitting and maximum vehicle speeds.

For maximum economy in weight and space . . . for short, easy shifts, specify Fuller. You'll agree that it's the best transmission *you* ever had.



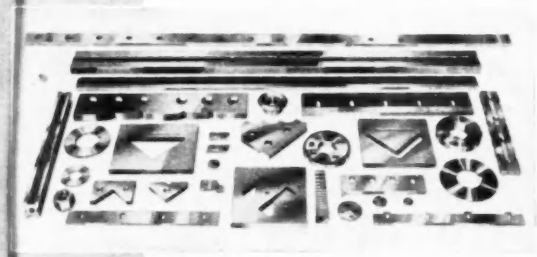
FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

HILL ACME TOOLS FOR INDUSTRY

GRINDING and POLISHING MACHINE

"Hill" 2-Roll Vertical Abrasive Belt ***Hydraulic Table Type*** for flat polishing of ferrous or nonferrous sheets and other materials . . . also, made in ***Pinch Roll Type*** for surfacing Sheets, Strips or Plates, whereby a group or battery of machines may be placed in series for continuous polishing . . . likewise built in ***Strip Type*** for processing strip material in coiled form . . . furnished in a progression of widths up to 60".



SHEAR KNIVES

"CLEVELAND" Knives and Shear Blades. Solid and laid steel shear blades; rotary slitting and side trimming knives; metal cutting machine knives.

VERTICAL GRINDER

"Hill" Open Side Vertical Spindle Hydraulic Surface Grinders are designed for rapid stock removal and accurate grinding of flat surfaces. Furnished in table widths of 18", 24" and 30"; table lengths 60" to 240".

HORIZONTAL GRINDER

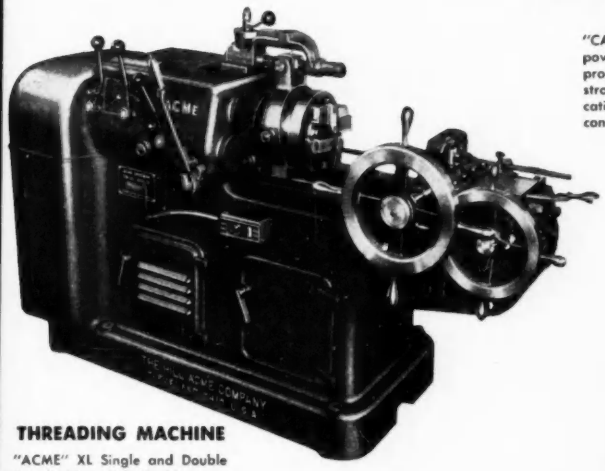
"Hill" Open Side Horizontal Spindle Hydraulic Surface Grinders for accurate grinding of flats, angles, irregular and special shaped surfaces. Furnished in table widths up to 36"; table lengths 60" to 240".

FLOOR CRANE

"CANTON" Portable Cranes are constructed of welded steel, with high tensile drop forgings; equipped with self-locking worm as safety feature. Made in 8 sizes from 1 to 3 ton capacity. Fast, safe, one-man operation.

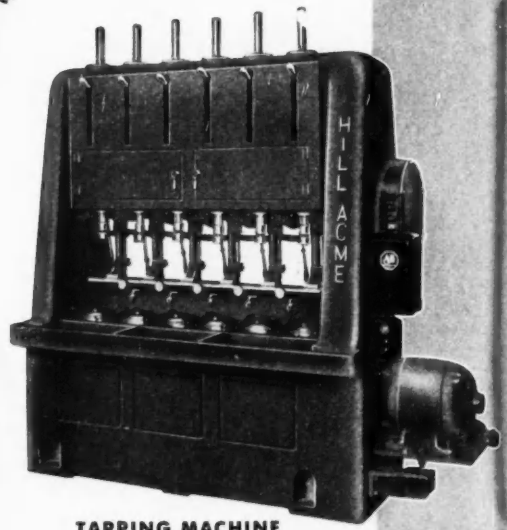
ALLIGATOR SHEAR

"CANTON" Alligator Shears are the most rugged, powerful and trouble free shears ever built for processing scrap. Modern design has produced a stronger shear, with fewer parts, and positive lubrication. Made in a full range of sizes to meet every condition.



THREADING MACHINE

"ACME" XL Single and Double Spindle Threading Machines are equipped with patented tangent or hob type die head which assures economical, accurate, high speed production. Furnished in sizes from 1" to 3" capacity.



TAPPING MACHINE

"ACME" model XC-W six spindle Coupling Tapper. Built in 1" capacity and larger, in 4, 6 or 8 spindle. Can be adapted as a nut tapper.

FORGING MACHINE

"ACME" XN Forging Machines produce accurate, quality forgings for long uninterrupted periods. Massive construction and simplicity of operation insure years of trouble-free service. Built in 7 sizes from 1 to 5 inches.

HILL ACME TOOLS FOR INDUSTRY

The HILL ACME COMPANY

PLANTS AT 1201 W. 65 ST. AND 4533 ST. CLAIR AVE. *Cleveland, Ohio*

NEW PRODUCTION AND PLANT EQUIPMENT

For additional information regarding any of these items, please use coupon on page 54

(*Continued from page 92*)

To illustrate, the Aircomatic transfers across the arc virtually 60 per cent of the titanium that may be present. Existing metal arc welding methods

Air Reduction Sales Co.'s Aircomatic equipment in action

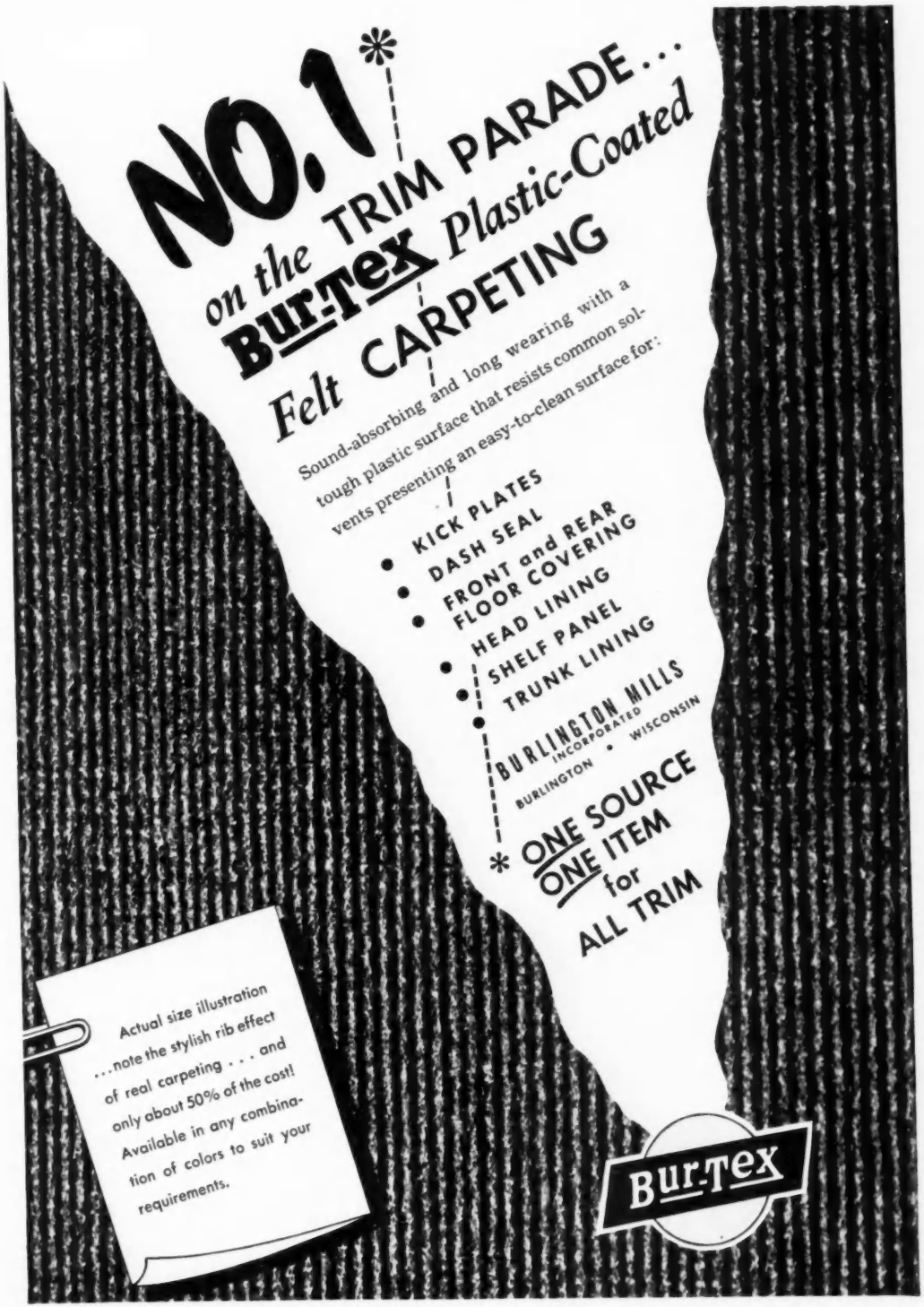
lose almost all of it. This makes feasible the use of titanium stabilized filler metal rather than columbium stabilized—a factor of importance should there be an international emergency, the company points out.

E-82—Cushioned Conveyor For Body Stampings

Designed for automobile body stamping departments, a new adjustable cushioned conveyor unit for eliminating denting, rubbing or scratching of stampings has been brought out by William F. McGraw & Co., East Milwaukee, Wis. This endless belt conveyor takes stampings from the press and eliminates the "slider board" or salt type conveyors. It was developed to end costly hand finishing operations prior to painting.

The cushioned conveyor unit provides shock elimination and complete protection from contact with metal surfaces. The unit features an oilproof synthetic rubber covered belt supported by neoprene cushioned idler rolls, and an automatic spring tension full floating tail pulley which moves with the shock tension caused by receiving stampings.

Heavy forged casters and rigid frame construction are said to permit frequent movement of the entire conveyor unit even over rough floors to serve different presses, without damage to the unit. A hand crank provides adjustability of height and conveyor angle so that stampings may be received from extremely low dies and delivered to unusually high elevations at discharge end, or vice versa.


NO. 1*
on the TRIM PARADE...
Bur-Tex Plastic-Coated
Felt CARPETING
Sound-absorbing and long wearing with a tough plastic surface that resists common solvents presenting an easy-to-clean surface for:
• KICK PLATES
• DASH SEAL
• FRONT and REAR FLOOR COVERING
• HEAD LINING
• SHELF PANEL
• TRUNK LINING
BURLINGTON MILLS
INCORPORATED
BURLINGTON • WISCONSIN
* ONE SOURCE ONE ITEM for ALL TRIM
Actual size illustration ...note the stylish rib effect of real carpeting . . . and only about 50% of the cost! Available in any combination of colors to suit your requirements.
Bur-Tex

NEW PRODUCTS

For additional information please use coupon on page 54

(*Continued from page 48*)

affected by heat, cold, or chemicals of any kind. It laps to drop-tight seals and never needs lubrication. Neither will it expand, contract or warp under most extreme conditions. It is an ideal material for seals, bushings or bearings that are "buried" because they are claimed never to need maintenance attention, and normally last the life of the machine in which they are installed.

F-109—Automatic Whiteprinting Machine

Announced by the C. F. Pease Co., Chicago, Ill., is direct process Whiteprinting equipment called the Pease Pacemaker which consists of a completely automatic reproduction machine for printing and developing ammonia vapor white prints continuously, in cut sheets or from rolls, at speeds ranging up to 32 ft per min. It reproduces tracings, drawings, foil, film or anything typed, written or drawn on reasonably translucent paper. It accommodates all types and sizes of diazo materials up to 42 in. wide.

Automatic signal lights indicate various conditions in the functioning of the machine during its operation. push button master switch control all electric motors and heaters, instantaneously starting or stopping the mechanism.

A sliding revolving variable contact feature enables selection of either sliding-revolving contact or straight revolving contact.

Pease Pacemaker automatic whiteprinting machine

A new type interlocking roller developer permits development of all types of diazo materials without sticking, scratching or wrinkling, and prevents prints from becoming lost in the developer or emerging dog-eared or distorted. Design of this assembly keeps the prints completely exposed to ammonia vapors to insure complete and full development even at maximum production speeds. Tracking of the developer band is controlled automatically, freeing the operator of any attention to this unit whatsoever. Separation of the tracings or original copy from the sensitized material is another automatic operation. Exposed prints are automatically conveyed into the developer while the tracing or original copy is returned to the operator for additional feedings. A tracing return device delivers tracing to the operator in the receiving tray.

The cooling system cools the high pressure tube and maintains a constant and low temperature across the entire width of the glass contact cylinder. A powerful exhaust system completely expels ammonia vapors, eliminating need for a canopy or hooding device above the machine.

Both prints and tracings are delivered and stacked automatically in original sequence in either front or rear adjustable receiving trays. A front delivery roller device automatically conveys prints to the receiving tray flat and in proper order.

The new type formica feed table is

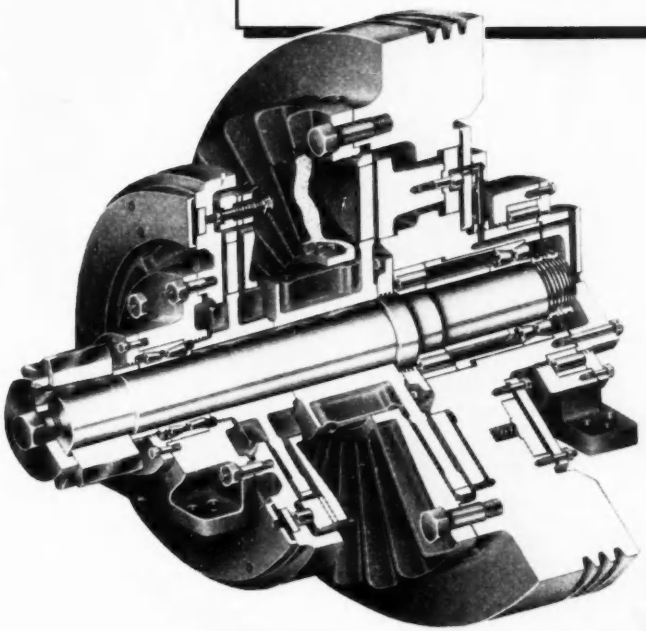
For Greatly Improved Press Performance
Greatly Reduced Maintenance Time—

the new **CLEARING**

tornadyne

TRADE MARK

clutch and brake unit



Because press performance—and maintenance requirements—are so largely dependent upon the clutch, this newest Clearing development has an important dollars-and-cents significance for every press user.

By reducing the number and weight of the parts which stop and start, Clearing engineers have created a clutch and brake unit which eliminates approximately half of the energy loss common to presses equipped with conventional clutches. That means only half as much heat is developed, so the clutch runs cooler and the power bill is smaller.

Complete elimination of packing and rubbing seals has reduced maintenance needs very materially. Changing friction linings requires no crane or hoist—the whole operation takes well under an hour.

A Clearing press has always been a highly profitable investment from a cost-reducing standpoint. With the new *tornadyne* clutch and brake unit as standard equipment, Clearing presses become still more profitable as production machines.

CLEARING MACHINE CORPORATION
6499 West 65th Street • Chicago 38, Illinois

PRINCIPAL FEATURES OF THE *new* CLEARING *tornadyne* *clutch and brake unit*

- ★ Minimum inertia loss due to small mass of parts that start and stop with each cycle.
- ★ No air cylinder packing. A nylon diaphragm with ¼" travel does the work.
- ★ All-metal labyrinth seals, with no wearing parts, replace leather or composition packings for retaining lubricant.
- ★ All drive shaft bearings, including flywheel, lubricated by automatic system or from floor level.
- ★ Friction inserts easily replaced without disassembly of parts from the press and without need for crane or hoist.

—and many other features.

SEND FOR DETAILS

The complete story of the Clearing *tornadyne* Clutch, with all its features described and illustrated, is available in a new bulletin. A copy will be sent free at your request.

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

NEW PRODUCTS

For additional information please use coupon on page 54

impervious to cigarette or chemical burns and wide enough so that paper and tracings may be stacked at either end. A paper cutting device for roll stock is mounted directly under the leading edge of the feed table.

The Pacemaker operates on wiring of 200 to 250 volts, 60 cycle single phase a.c with a starting current of 32 amps and running current of 48 amps or a kw load of 9.6. Net weight is approximately 2500 lbs. Extreme width is 7 ft-6 in. and height is 7 ft. Extreme depth with feed table is 4 ft-5½ in.

F-110—Plastic Upholstery Fabric

Development of a new polymer—ethylenic plastic—by the E. I. du Pont de Nemours and Co., Inc., Wilmington, Del., permits for the first time manufacture of a coated fabric without plasticizer and without anti-oxidants—which is the secret of the toughness and pliability of the just announced upholstery fabric, "Armalon."

"Armalon" is being introduced first to the truck upholstery field, and as production increases, is to be introduced in all fields of application.

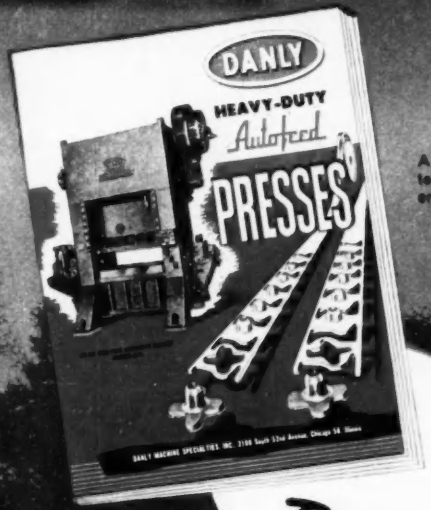
"Armalon" is said to be so tough, strong and pliable that in durability tests cushion springs broke before any signs of failure in the upholstery coating developed.

Usable indoors or out it will not stiffen with age since it contains no chemical that may eventually dry or massage out in service. In contrast, it is stated, the usual type of coated fabric consists of a textile base coated with one of several materials such as pyroxylin, rubber, synthetic rubber, resins, drying oils or lacquers to which solvents, pigments, anti-oxidants and plasticizers have been added.

In "Armalon" the absence of the plasticizer is additionally said to be proof against its stiffening when used over sponge rubber. The anti-oxidants in the rubber will not affect "Armalon," and for its part "Armalon" contains no chemicals which weaken sponge rubber. Furthermore it is stated that "Armalon" is made without anti-oxidants or other chemicals which might mar finished surfaces such as the paint on a truck cab, or varnish on a chair.

This "Armalon" ethylenic plastic coated fabric can be cut, sewed, tacked, padded, and formed without any special handling. It is now available for truck upholstery on both broken twill and sateen fabric constructions in a variety of colors and texture effects.

(*Turn to page* 102, *please*)



A new 16 page booklet to tell you about real press engineering achievements.

HERE'S REAL PRODUCTION NEWS!

SEE WHY IT COSTS LESS TO RUN A DANLY PRESS!

This new booklet has been especially prepared to introduce the unique production advantages of the Danly Heavy Duty Autofeed Press . . . advantages that are certain to reduce stamping costs in your plant! Read about the new design principles that enable the Danly cool-running clutch to outwear conventional press clutches 7 to 1!

Check such outstanding advantages as extra frame rigidity, greater resistance to vibration and deflection at high speeds and consequent increased die life. Others include complete pressure lubrication, variable speed drive and more sensitive control reaction. Higher operating efficiency is assured over a greatly expanded tonnage range.

Also included are complete specifications on Danly Heavy Duty Autofeed Presses from 50 to 800 tons. Send for this booklet and see how Danly Autofeed Presses offer the advantages of automatic feeding in high tonnage capacities.

Detailed descriptions and illustrations explain the cost and performance advantages of exclusive Danly features.

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Please send my copy of the new Danly Heavy Duty Autofeed Press Catalog.

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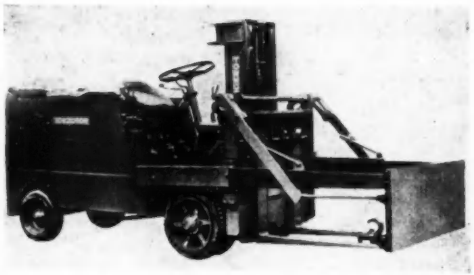
For additional information please use coupon on page 58



Towmotor die handling unloader shown on a Model LT-72 Towmotor lift truck

(Continued from page 100)

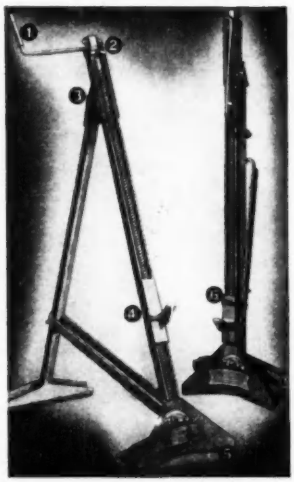
F-111—Die Handling Unloader

Carrying heavy dies weighing thousands of pounds to and from the die table of a press is eased by use of a die unloader manufactured by Towmotor Corp., Cleveland, Ohio. The die is picked up on the forks of the lift truck, transported to the press, and deposited on the die table by extending the steel pusher plate of the hydraulically operated unloader.

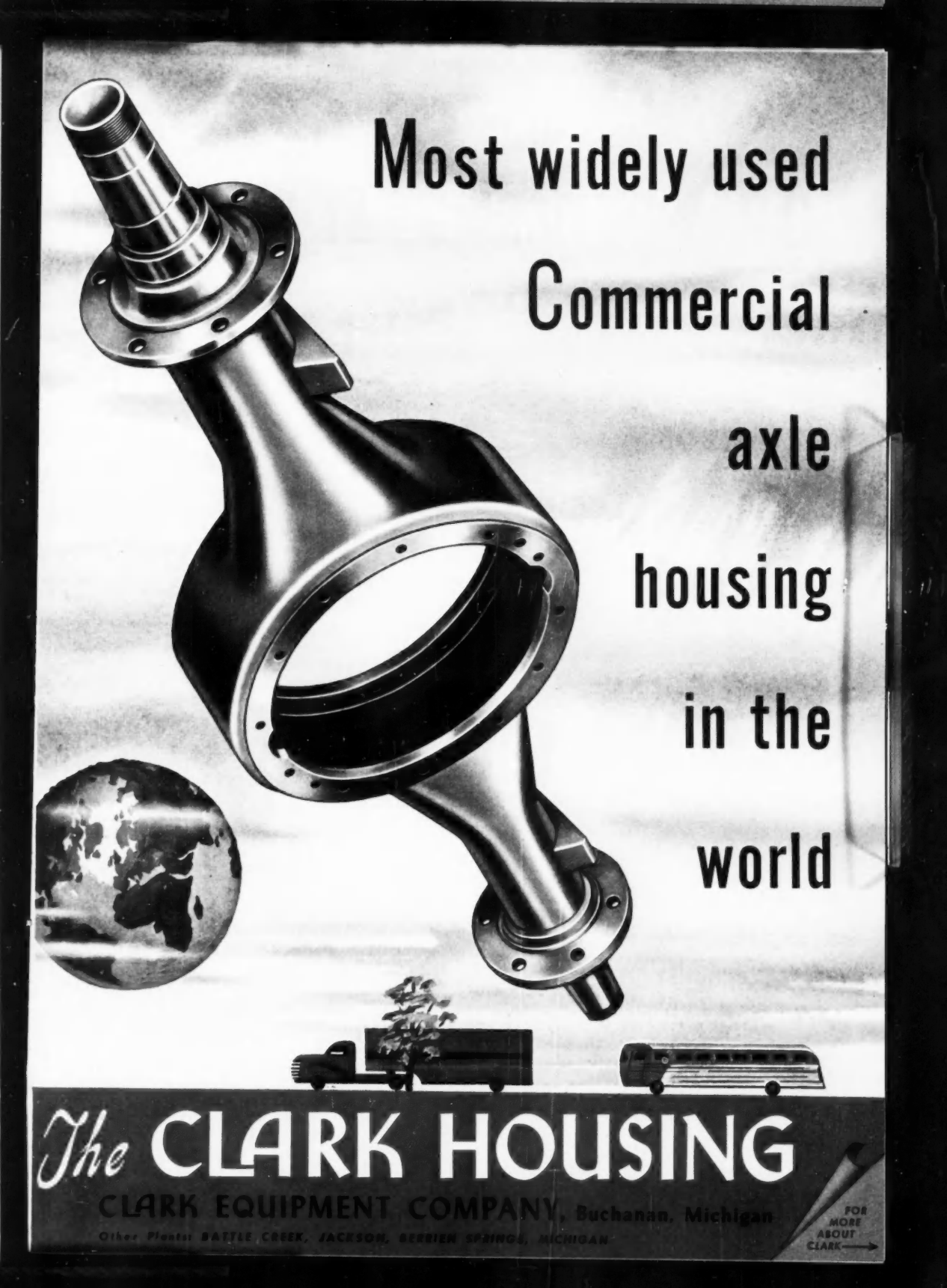
To remove the die from the table of a press a length of chain is passed around the die and linked to hooks at each side of the pusher plate. Then, by retracting the unloader arms, the die is pulled onto the truck forks.

The unit has a capacity of 8900 lb at 25 in. load center, and a lift height of 72 in.

F-112—Bipod Bumper Jack



Built on the "bipod" principle, this bumper jack called "Saf-Lift" is offered by Auto Specialties Mfg. Co., St. Joseph, Mich. The jack's refinements at 6 points of operation consist of: (1) New type rotating grip on handle to make lifting jobs easier on the hands. (2) High-quality ball bearing to help operate the lifting screw smoothly and quietly. (3) A bipod sleeve casting to assure maximum strength and safety. (4) The facing of the bumper grip has been extended to give additional protection to the lifting screw and ease the gripping of extra-wide bumper bars. (5) The newly-designed claw-foot front leg provides greater stability and additional resistance to soft ground. And (6) A canvas strap makes the jack easier to handle when folded.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MATERIAL HANDLING *News*

It's a Real Sight at Sealright

—MODERN MATERIALS HANDLING IN ACTION

Palletized cases of finished products are taken from storage to the shipping dock by the fork truck. Intelligent planning has resulted in a practicable schedule which keeps these versatile machines almost continuously "on the go."

Wanted: a materials-handling method engineered to keep pace with and be a dynamic factor in a high-speed mass-production plan—by the Sealright Company, Inc.
Found: a simple, practical answer in a fleet of Clark fork-lift trucks.

This integrated manufacturing plant and branch warehouse produces paper products—bottles, bottle caps and hoods, cylindrical containers, cups and related items; ships an average of 10 to 12 carloads per day, with seasonal peaks up to 20 cars; and consumes daily about 40,000 pounds of paper shipped from the company's own mills.

Formerly, handling that huge tonnage was a tricky, back-breaking and dangerous business. Now it's simple. Use of Clark Methods and machines has just about doubled storage capacity; and handling operations are fast, easy and safe. The fork trucks unload cars, keep production supplied, move drums of adhesive, handle bales of waste, load cars, do many odd jobs.

Savings have never been calculated, but are said to be "extraordinarily large."

Waste paper cuttings accumulate rapidly and are baled for return to the mill. Handling them is a simple job for the fork trucks, which take them directly into the box car and stacks them.

Write for Material Handling News

The Material Handling News, with profusely-illustrated reports of increased production at decreased cost, should be MUST reading for every alert businessman. A request on your business letterhead will bring you the current issue.

CLARK ELECTRIC AND GAS POWERED **FORK TRUCKS**
AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., **CLARK EQUIPMENT COMPANY** BATTLE CREEK 66, MICH.
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AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

PRODUCTS OF CLARK—TRANSMISSIONS FORK TRUCKS & TRACTORS AXLE HOUSINGS
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FRONT AND REAR AXLES FOR TRUCKS AND BUSSES METAL SPOKE WHEELS TRACTOR UNITS

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

General business activity continued at relatively reduced levels during the week ended Oct. 22. Department store sales, railway freight loadings, crude oil output, bituminous coal production, and construction were higher than in the preceding week, while electric power production decreased. The *New York Times* index of activity for the week ended Oct. 22 stands at 121.5, as compared with 121.8 in the preceding week and 151.2 a year ago.

Sales of department stores during the week ended Oct. 22, as reported by the Federal Reserve Board, equaled 295 per cent of the 1935-39 average, as compared with 290 in the week before. Sales were 14 per cent below the corresponding distribution a year ago, as against a preceding decline of 12 per cent. The total in 1949 so far reported is six per cent less than the comparable sum in 1948.

Electric power production declined contraseasonally during the week ended Oct. 22. The output was 2.2 per cent below the corresponding amount in 1948.

Railway freight loadings during the same period totaled 589,088 cars, 0.9 per cent more than the figure for the week before but 36.5 per cent below the corresponding number recorded in 1948.

Crude oil production in the week ended Oct. 22 averaged 5,072,100 barrels daily, 28,550 barrels more than in the preceding week but 571,400 under the comparable output a year ago.

Production of bituminous coal and lignite during the same week is estimated at 2,540,000 net tons, 150,000 more than the output in the week before but 9,988,000 below the corresponding quantity in 1948.

Civil engineering construction volume reported for the week ended Oct. 27, according to *Engineering News-Record*, was $135,843,000, or 12 per cent more than the preceding weekly figure but 24 per cent below the comparable sum in 1948. The total recorded for 43 weeks of this year was 16 per cent more than the corresponding amount in 1948. Private construction for the period was 14 per cent above that a year ago, and public construction increased by 18 per cent.

The wholesale price index of the Bureau of Labor Statistics during the week ended Oct. 18, at 152.1 per cent of the 1926 average, showed no variation from the preceding week but was 8.3 per cent below the corresponding figure in 1948. Prices of print cloth and steers established new peaks for 1949 and coffee a new postwar record, while hog prices declined to the lowest level since OPA controls were eliminated.

Member bank reserve balances decreased $207 million during the week ended Oct. 26. Underlying changes thus reflected include a decline of $324 million in Reserve bank credit and increases of $57 million in Treasury deposits with Federal Reserve banks, $21 million in non-member deposits and other Federal Reserve accounts, and $3 million in Treasury cash, accompanied by a decrease of $99 million in money in circulation.

Total loans and investment of reporting member banks increased $232 million during the week ended Oct. 19. An advance of $81 million in commercial, industrial, and agricultural loans was recorded. The sum of these business loans, $13,647 million, shows a net decrease of $1727 million in 12 months.

Basic Problems of Aircraft Producibility

(*Continued from page 40*)

discussions were actively inquiring, exploring, challenging, sharpening their wits, and broadening their horizons. The subject of producibility is a big one and the many newly developed production methods are constantly adding to its complexity. Future SAE meetings will probably continue to explore the subject even more fully.

Design for Producibility

The panel on basic problems of producibility started the ball rolling. Defining producibility as manufacture with minimum expenditure of materials, time and labor, Brig. Gen. A. H. Johnson, of the Air Materiel Command, read Maj. Gen. F. M. Hopkins' paper. The general said that producibility is now considered a major item in the evaluation of new aircraft design. It is possible to attain optimum producibility in the design stage by early agreement between design and production engineers on such points as performance, processes, costs and available production equipment. Design demands simplicity of configuration, ease of fabrication, and ease of component installation. It involves the choice of materials, the efficiency of fabricating processes, and the use of readily available tools.

The aircraft manufacturers' problems and solutions were discussed by Hall L. Hibbard, vice-president and chief engineer, Lockheed Aircraft Corp. He suggested that the military services incorporate in prototype contracts coverage of producibility during experimental stages, pointing out that both airplane design and manufacture are evolutionary processes and that final results can be known only when it is possible to see how the many and complicated parts work together in the final structure.

Those bare essentials which are fundamentally integrated with the basic skeleton were proposed by Hibbard as the first order of producibility. The second order should comprise design considerations which define detail simplicity, effective use of standard parts and materials, and serious consideration of expansibility of production.

Lack of product design, of machine tools, and of materials are definite handicaps to the producibility of jet engines, according to E. B. Newill, vice-president, General Motors Corp., and general manager, Allison Division, who spoke on jet manufacturers' problems and their solutions.

He explained that a manufacturer cannot produce these powerplants unless he has buildings, design, machinery, materials, money, people, and tools; and said that the lack of any of these would delay production. Newill proposed that once annually the military ask each manufacturer whether he could deliver a specified type of engine in a specified quantity within 18 months. Manufacturers who foresaw bottlenecks would report them and the military and manufacturers would then join in developing a program to make the required production possible.

Development of a production-type jet engine, declared Newill, is less a matter of engineering compromise than of blending a superior alloy. He said it has been possible, in the case of one jet powerplant, to reduce by four-fifths the volume of six critical materials essential to its production, yet simultaneously to increase power by about 30 per cent, to reduce fuel consumption five per cent, and to save nearly 200 lb in overall weight.

Performance for Morale

Attention must be paid to the performance as well as the producibility of wartime aircraft. In case of war,

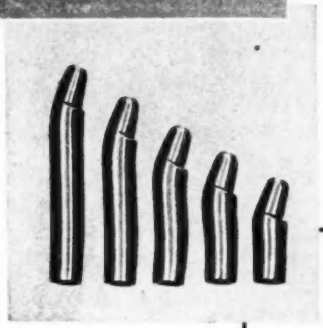
(*Turn to page 108, please*)

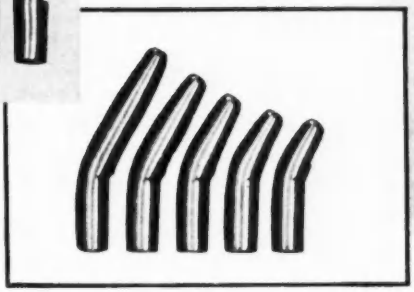
SPECIAL ANNOUNCEMENT FROM RESISTANCE WELDING ELECTRODE HEADQUARTERS

New

Mallory Single Bend Tips...

Developed to replace irregular forged or cast tips





Single bend tips can be supplied with bends of varying degrees from 0° to 45° and in varying over-all lengths at minimum costs. Illustrated is a cross-section of the many combinations of angles and over-all lengths available.

Tips made from rod stock possess superior physical and mechanical properties over tips made from castings or forgings. Mallory research and engineering have now developed single bend tips, *cold-formed* from standard, stocked, straight tips which may be used as replacements in gun or special applications where forged or cast tips are being used. Single bend tips also bring the cooling water closer to the welding face.

These new Mallory Single Bend Tips will stand greater impact . . . increase number of welds between dressings . . . give more uniform welds . . . *assure longer tip life*. And, they cost you less than cast or forged tips!

Mallory Single Bend Tips are available in #1 and #2 Morse Taper, and can be supplied with a bent welding face angle varying from 0° to approximately 45°.

Send details of your application or electrode requirements. Let us recommend the proper tip for your job.

In Canada, made and sold by Johnson Matthey & Mallory, Ltd., 110 Industry St., Toronto 15, Ontario.

Resistance Welding Tips, Holders, Dies, Rod and Bars, Castings, Forgings

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superiority of performance is a dominant factor, both from the standpoint of damaging the enemy and of maintaining fighting morale. This thought was added by Rear Admiral Alfred M. Pride, USN, chief of the Navy's Bureau of Aeronautics.

Design and Fabrication

Significant structural design and fabrication developments were the subjects of another producibility panel discussion. It was revealed that this country has a shortage of extrusion presses of adequate capacity. The German aircraft industry, preparing for World War II, early turned to large forge presses, Lt. Gen. K. B. Wolfe, deputy chief of staff for materiel, USAF, reported. General Wolfe said that presses of 4000 to 5500 tons capacity were the largest available in the United States, although the German aircraft industry had a 30,000 ton press, three 15,000 ton presses, and numerous smaller units. Our government, he added, has now financed the construction of an 18,000 ton press, and large units have been brought here from Germany so that larger aircraft forgings may now be made.

Efficiency and producibility are factors of equal importance in aircraft design, asserted the general, and should begin with the first design of a new type.

Webs Replace Ribs

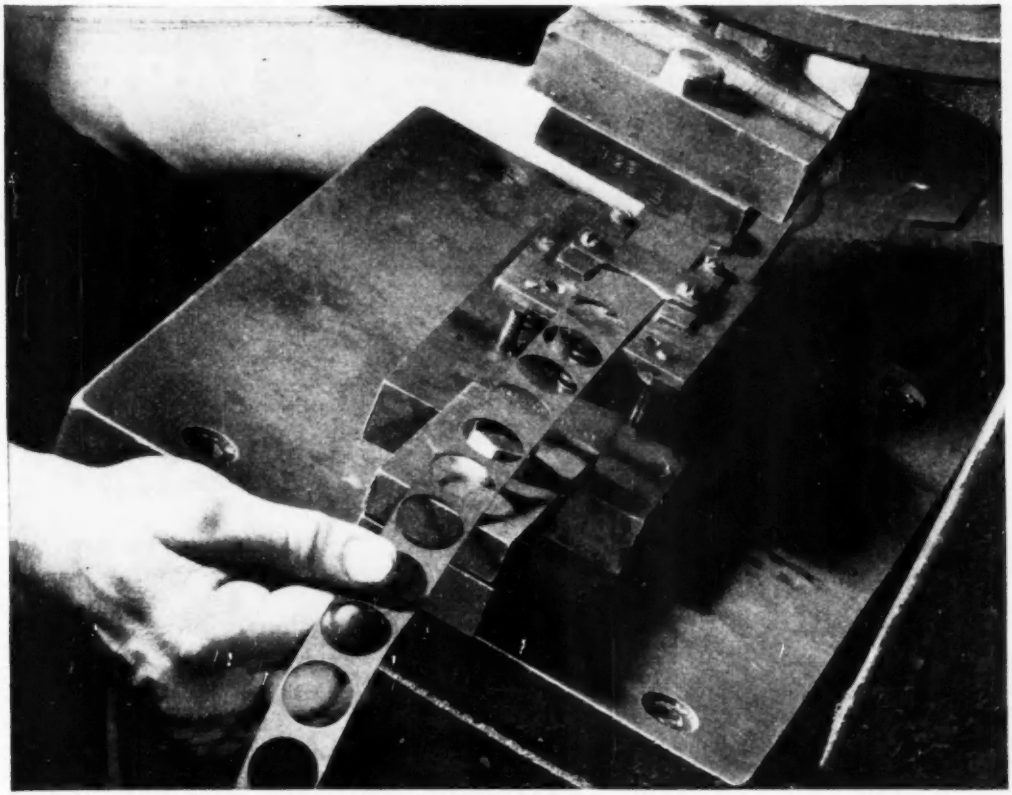
Tapered sheet and large pressure forgings have been made necessary not only by the jet engine but by a new design philosophy applied to aircraft wings in which ribs are replaced by webs covered with bending material, according to S. J. Pipitone, wing design engineer, the Glenn L. Martin Co. The spanwise internal structure provides greater enclosed space for controls, lines, and ducts. Producibility is enhanced because of the greater ease of assembly, and there are substantial savings in weight and in cost. Pipitone recommended the use of machine tapered sheet for wing coverings, commenting that the machining process is economical even now and will be even more economical with further developments in technique and equipment.

Volume and Precision

Manufacture of jet engine parts calls for volume fabrication of symmetrical precision units, thus permitting application of automotive mass-production techniques, it was reported by W. C. Heath, chief engineer, Solar Aircraft Co. Flow lines, conveyor lines, and single-purpose welding machines now may be used, and the elimination of hand-worked complicated shapes speeds production tremendously.

In case of war, more than 20,000 aircraft gas turbine engines would be required monthly, it was estimated by A. T. Colwell, K. M. Bartlett, and R. E. Cummings, all of Thompson Products, Inc. They said the output of 20,000

(*Turn to page* 110, *please*)



Tensilite 300, a product of Plastic Products Division, The J. P. Lewis Co., Beaver Falls, N. Y.

New insulation punches better ... pinches pennies, too!

THE machine pictured here is cold punching a high pressure laminate insulating material—an operation that often "just couldn't be done." Now it *can* be—easily—using Tensilite 300, with important savings to boot.

Tensilite 300 is a new high pressure plastic laminate. It's made of a new type of virgin pulp paper, Hycar American rubber, phenolic resin and other ingredients.

Hycar makes the sheet highly flexible, eliminating the problem of a too brittle sheet which may crack or tear during punching. With most conventional laminates, it is often necessary to heat prior to punching. With Tensilite 300, the thinner laminate sheets may be punched cold.

Hycar imparts other exceptional advantages, too. It improves practically all strength properties of this new insulating material . . . gives it better moisture resistance and electrical properties. All this at approximately half the cost of a standard high pressure laminated material!

Hycar made an improvement *and* did a cost-saving job here as it has in so many other fields. For Hycar is extremely versatile—light in weight, resists oil, gas, heat, cold, weather, wear and abrasion. Besides being a base material, it may be used as a plasticizer for polyvinyl resins . . . as a modifier for phenolic resins . . . as an adhesive base . . . as a latex for coating and impregnating.

Hycar may be just what you're looking for to solve a problem, or get a new product to market, profitably. Complete information and technical advice are yours for the asking. Just write Dept. HC-11, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

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gas turbines monthly would require about 25 million compressor rotor blades and stator vanes, two million turbine blades, and 1½ million nozzle vanes a month.

New Methods

The difficulty of producing parts for turbine engines, because of close tolerances and hard-to-work materials, is a handicap to producibility which must be considered in the design stage. Production is expedited through use of the "lost-wax" investment casting process for making blades and vanes. The new Mercast process appears to be of additional help by assuring precision casting through the employment of mercury patterns at moderately low temperatures, and by curtailing scrap losses.

A Glance to the Future

An interesting highlight of the meeting was the panel discussion, "A New Appraisal of the 1955 Air Transport." Actually, a better title for this symposium would have been "A Further Appraisal." Last year's meeting established a basic assumption for the long-range overseas transport of 1955: Range, 3500 miles plus reserve; cruising speed, 400 mph minimum; capacity, 50 to 100 passengers. (See AUTOMOTIVE INDUSTRIES, Nov. 15, 1948.)

A further appraisal of the 1955 transport was made this year. The four participants in the panel visualized a new version of the 1955 transport plane as follows: Equipped with four turbo-prop, or perhaps turbo-jet engines; carry 50 passengers internationally, 58 locally, on flights of 830 to 3500 miles; travel at a speed of 500 to 550 mph at altitudes of around 35,000 ft; and require airports with 9000 ft runways.

Jet transport planes will not be carrying passengers on U. S. scheduled airways much before 1955. American aircraft manufacturers are not lagging behind British developments in this field but are, on the contrary, technically far advanced and much more realistic in their appraisal of possible markets, according to Carlos Wood, preliminary design engineer, Douglas Aircraft Co.

Not Economically Sound

Wood feels there is no economic justification for replacement of current 300 mph airliners with any jet transport of less than 500 mph speed, and thus turbo-jet "interim" transports do not readily provide an acceptable substitute for the jet in the American picture. On the basis of 1948 traffic, only 25 jet transports would be required to serve trans-Atlantic trade, and a total of 100 jet transports would fulfill commerical traffic requirements down to 800 mile ranges.

Although minimum costs of a prototype commercial jet transport would be $22½ million, it might be possible to

(*Turn to page* 112, *please*)

TOOLING UP? You save three ways when you harden the Vapocarb-Hump way

IN tooling up for new products . . . or retooling for present models . . . there's often opportunity to make significant savings, simply by improving the heat-treatment of necessary punches, dies, and other tools. For the heat-treatment — the strength-giving process in tooling-up — largely determines the value of all tool designing and machining which have gone before.

A tool like the one above, for example, is worth at least $150 when it reaches the heat-treat, for at that point it represents a hundred pounds of high-grade steel plus several days of painstaking effort and irreplaceable labor. It's up to the heat-treater to help meet production time-tables and assure that this previous investment results in a tool which will give maximum service.

With a Vapocarb-Hump furnace for hardening . . . and a Homo furnace for tempering . . . a competent heat-treater will give you the full results to which his skill and experience entitle you. He'll make any tool — whether a massive die, an insert, or a tiny slitting edge — perform to maximum ability. He'll make your heat-treat a steady source of triple savings . . . savings which reach back into the toolroom — and forward into production departments.

1. Little or no refinishing . . . because tool surface is protected by Vaporcarb atmosphere control

2. No rejections . . . because tool shape and size are "as expected" under rate of heating control

3. Long tool life . . . because correct internal structure can be produced through Hump control of quench point

• • •

Ask an L&N engineer to explain the Vapocarb-Hump and Homo Methods. Or, if you prefer, we'll send our catalog. Leeds & Northrup Co., 4966 Stenton Ave., Philadelphia 44, Pa.

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sell the airplane at the 100 quantity for around $2 million each, Wood believes.

Limit of Engine Development

"We may find that by 1955 the reciprocating engine will have reached the limit of its development. We may also find that the turbo-jet engine, due to its accelerated rate of development, will be nearing its potential performance for transport applications. The turbo-propeller engine, meanwhile, will be susceptible to continued development toward appreciably higher performance than the 1955 predictions." This was brought out by Donald S. Jordan, project engineer, Pratt & Whitney Aircraft Division, United Aircraft Corp.

Manly Presentation

The 1948 Manly Memorial Medal was awarded this year to Andrew Kalitinsky, chief engineer of the NEPA Division of Fairchild Engine & Airplane Corp., Oak Ridge, Tenn., for his paper "Atomic Power and Aircraft Propulsion." The SAE presents the award annually for meritorious contribution to aeronautic engineering.

Versatile Gas Turbines

The first gas turbines to pass Government type tests which are small enough for use as automobile engines were displayed for the first time by AiResearch Manufacturing Co. One of the units is for use as a source of compressed air with a rating of about 65 hp and a weight of 88 lb. The other is designed to drive an electric generator absorbing up to 85 hp. An AiResearch engineer said that neither of these units was designed for use as an automobile engine but that either could be used with suitable transmissions. The air compression unit could drive a vehicle by means of pneumatic motors. The 85 hp shaft power unit could propel an automobile by either electric or hydraulic means. He emphasized, however, that neither could be considered a suitable power plant for the modern automobile in competition with piston engines. Many problems of exhaust gas disposal and high fuel consumption must be solved before a practical automobile power plant is achieved. This would require several years of development.

The intended purpose of these new gas turbines is to provide auxiliary power for large aircraft. Their low installed weight makes units of this type highly desirable, according to the company, since the operational load requirements are such that the higher fuel consumption is not an important factor.

Products Displayed

Twenty-five national manufacturers exhibited their products at the aircraft engineering display. Exhibitors included:

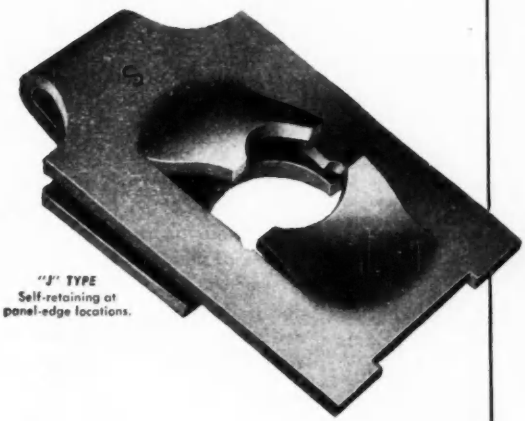
(*Turn to page* 114, *please*)

FASTER ... EASIER and TIGHTER!

"LATCHING" TYPE
Self-retaining at mid-panel locations.

SEND FOR THIS FREE SAMPLE KIT!

Check the operating and performance advantages of Shakeproof "SPEED NUTS" right in your own assembly procedure.



"J" TYPE
Self-retaining at panel-edge locations.

FASTENING HEADQUARTERS
TRADE MARK

Shakeproof "SPEED NUTS" outperform ordinary nuts in all three basic elements of fastener performance... speed of assembly, ease of tightening and resistance to vibration loosening. They tighten quickly and provide a positive, vibration resistant thread lock without extreme torque.

And, when the "SPEED NUT" principle is incorporated in specially designed fastening devices, performance advantages—and savings—multiply! The two Shakeproof "SPEED NUT" Types illustrated here, specially designed to simplify assembly at hard-to-reach fastening points, typify the advantages of "engineered" application of the "SPEED NUT" principle. Test Shakeproof "SPEED NUTS" in your particular application . . . see how you can save! Send for your *free* testing sample kit today!

SHAKEPROOF, inc., Division of Illinois Tool Works, 2501 North Keeler Avenue, Chicago 39, Illinois.

Shakeproof
SPEED NUTS*

(T. M. Reg. U. S. Pat. Off. by Tinnerman Products, Inc.

(*Continued from page* 112)

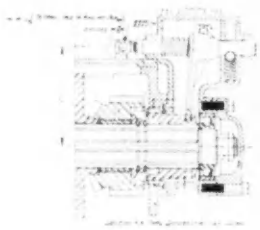
Aeroquip Corp.; Stratos Corp.; Bendix Aviation Corp.; Micro Switch, Division of First Industrial Corp.; Hydro-Aire, Inc.; Airborne Accessories Corp.; Westinghouse Air Brake Co.; Aeroproducts Division, General Motors Corp.; Electro-Switch and Controls, Inc.; Sperry Gyroscope Co., Division of the Sperry Corp.; Scintilla Magneto Division, Bendix Aviation Corp.; Ryan Aeronautical Co.; AiResearch Manufacturing Co.; Parker Appliance Co.; Western Gear Works; Jack and Heintz Precision Industries, Inc.; The Cleveland Pneumatic Tool Co.; Lear, Inc.; Vickers, Inc.; Minneapolis-Honeywell Regulator Co.; Herrmann Engineering Co.; Chiksan Co.; Solar Aircraft Co.; Axelson Manufacturing Co.; and Foote Bros.

Fuller Torque Divider

(*Continued from page* 39)

ratio of the divider section of 1.107 to 1, produce output ratios of 1.00 to 1 and 2.056 to 1.

Although the upper output shaft is located some distance above the normal oil level, ample lubrication is provided by a passageway connecting the two-speed case with the front bearing on the shaft. The wash of oil created by



This sectional view shows the lock by which the differential action in the power divider section of the new Fuller PD-45-H unit is eliminated to provide positive traction

the gears is pumped through this passage to the bearing. The rear bearing is open to the inside of the case and receives adequate lubrication from the normal circulation of oil.

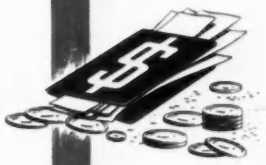
As will be noted on the accompanying illustration, provision is made for locking out the differential action between the two output shafts. Provision for a speedometer drive is also made at the rear end of the main or input shaft of the divider section.

Laminated Hardwood Parts For Station Wagon Bodies

(*Continued from page* 37)

Although some solid stock is still used in the bodies, a study is being made to determine whether or not laminating would be advantageous for these parts. Should this take place, all wood in Ford station wagons would be 100 per cent phenolic resin bonded by high frequency.

Save yourself some expense



Suppose that you need spark plugs—or such devices as oil filters, crankcase ventilation valves, ammeters, instrument panels, tachometers—for the engine, vehicle, or boat you manufacture. (Listed below are the products we make.) It will pay you to investigate AC before you select your supplier. There are two main reasons:

❶ We build many different types—sometimes hundreds—among which you may find *exactly* what you need. If so, you'll save substantially by avoiding the tooling and other costs which go with custom design and manufacture.

❷ By selecting AC products, you escape the expense of unsatisfactory performance in the service of your customers. The "batting average" of AC products is the highest we have encountered, and it covers many years of experience with more than 300 manufacturing customers.

Get in touch with any of our three offices, for detailed information.

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Flint 3, Michigan

Lincoln Tower Building
Chicago 1, Illinois

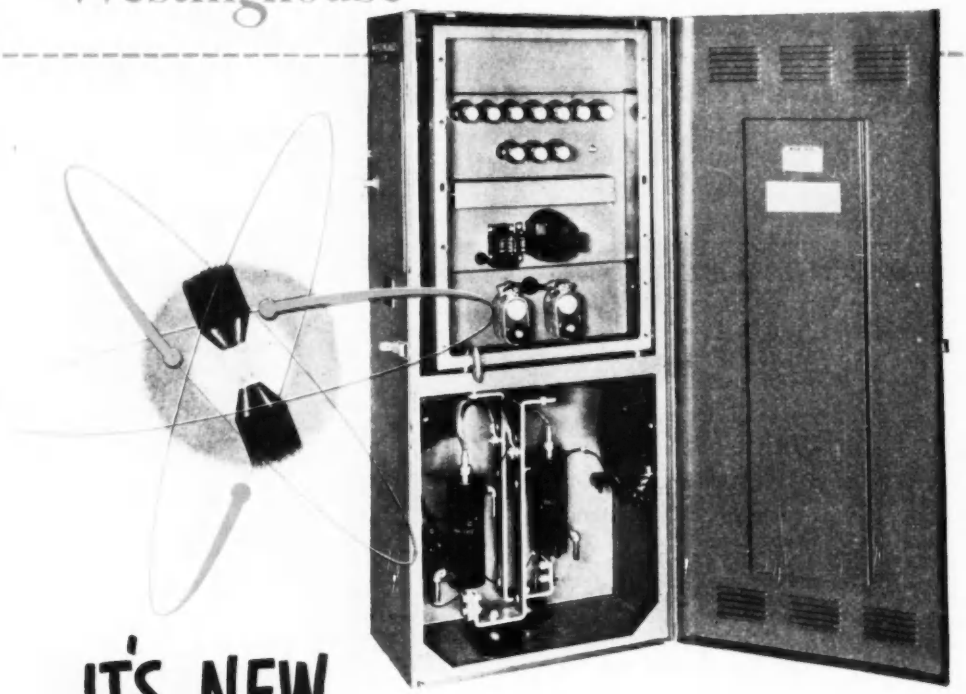
General Motors Building
Detroit 2, Michigan

- AIRCRAFT SPARK PLUGS
- AIR CLEANERS
- AMMETERS
- CARBURETOR INTAKE SILENCERS
- CARBURETOR INTAKE SILENCER AND AIR CLEANERS
- CRANKCASE BREATHERS
- CRANKCASE VENTILATION VALVES
- DIE CASTINGS
- DIE CASTING MACHINES
- BACK FIRE DEFLECTORS
- FLEXIBLE SHAFT ASSEMBLIES
- FUEL OIL FILTERS
- FUEL PUMPS
- FUEL AND VACUUM PUMPS
- GASOLINE GAUGES
- GASOLINE STRAINERS
- IGNITION CABLE TERMINALS
- INSTRUMENT PANELS
- LUBRICATING OIL FILTERS
- AIR GAUGES
- OIL GAUGES
- RADIATOR PRESSURE CAPS
- REPLACEABLE AIR CLEANER ELEMENTS
- AUTOMOTIVE SPARK PLUGS
- SPARK PLUG CLEANERS
- SPARK PLUG GAPPING TOOLS
- SPARK PLUG TESTERS
- SPEEDOMETERS
- SPEEDOMETER AND TACHOMETER DRIVE ADAPTERS
- TACHOMETERS
- THERMO GAUGES
- VACUUM PUMPS
- VOLTMETERS

AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



IT'S NEW . . .

it's fully electronic!

Look inside the new Westinghouse Resistance Welding Control and you'll spot many important advances in control design: reduced size . . . fewer components . . . a control panel that lifts out of place easily and individual control panels that can be removed separately. You'll find pay-off features everywhere.

You'll find something missing, too, but that's what makes this the most dependable control of all. By making every timing function fully electronic, virtually all moving parts have been eliminated. And when you consider the constant trip-hammer pounding of mechanical contactors and relays you understand why quiet, efficient, fully electronic operation means fewer costly breakdowns, less down time, less lost production.

This kind of dependability brings substantial long term savings that make the new all electronic Westinghouse Control the wisest investment regardless of price.

For full details, write for booklet B-4309. Address Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21535

Westinghouse

RESISTANCE WELDING CONTROL

Smoother Engagements

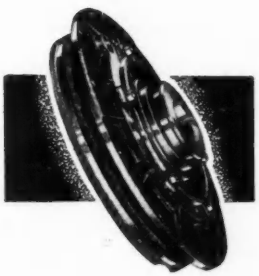
protect these 14 Vital Points!

NO GRAB!

NO SHOCKS!

NO JERKS!

LIPE TYPE ML CLUTCH



Lipe ML Clutch is designed so that it *must* engage smoothly—without grab, shocks or jerks—with maximum protection of the mechanism. Single spring operates twenty levers—all acting on pressure plate at same instant for uniform pressure, absolute parallelism, smoother engagement. For adjustment, simply remove shims from cover plate—normal torque capacity fully restored throughout life of friction material. Lipe ML Clutch adds miles and miles of life to your vehicle—slashes down-time expense for repairs and adjustments.

At Your Service—Sources of supply for Genuine Lipe Parts are available for your convenience and quick service at principal cities throughout the country, and at the Lipe-Rollway Factory. Write for full information.

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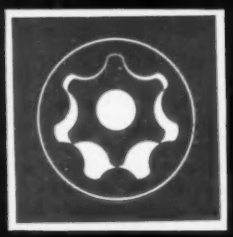

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A SURVEY of your aluminum castings requirements by Permite engineers may bring you important economies.

Structural design recommendations, made by Permite aluminum casting specialists, often increase the originally planned strength and bring savings in metal and machining, without affecting the utility of the part.

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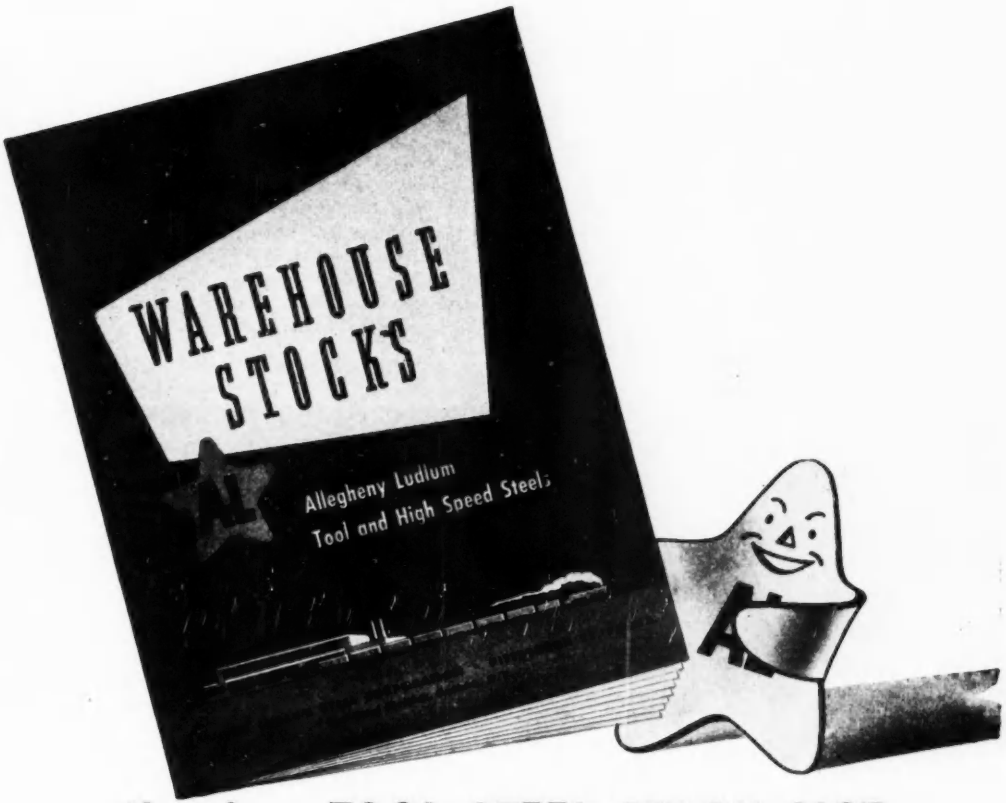

Here's a TOOL STEEL STOCK LIST that's really *Clear, Concise* and *Dependable!*

There's an A-L Tool Steel to do each job *best*

The Allegheny Ludlum Tool Steel family includes 37 principal types, covering the high speed, hot work, shock resisting, cold die, and carbon and low alloy steel fields. Let us help you find the best answer to *any* problem that occurs in your production or use of cutting and forming tools.

ADDRESS DEPT. AI-81

This 72-page catalog lists the stocks of A-L High Speed and Tool Steels which are constantly maintained in each of 18 warehouses, located at convenient points from coast to coast. In compact, easy-to-follow style, the book gives a complete stock picture, nationwide, of the 15 most widely used types of these steels—each in a full range of standard shapes and sizes—and also includes data on stocks of drill rod, tool bits and Carmet carbide metal blanks and tools.

It may be that your requirements call for mill shipments. If so, you can rely on us to schedule material for you without delay. *But*—if you depend entirely or in part upon ordering High Speed and Tool Steels in smaller lots—and want to know where you can get them *quickly*—you'll find A-L's book of "Warehouse Stocks" mighty handy to have in your desk. ● Write for your copy *today!*

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Pittsburgh, Pa.

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production proved CLEVELANDS help HOTPOINT speed schedules

Quality *at low unit cost* is a prime requisite in all of Hotpoint, Inc.'s modern appliance plants. For high speed, precision blanking and forming of appliance bodies and component parts, Hotpoint, Inc., utilizes a battery of Modern Cleveland Presses.

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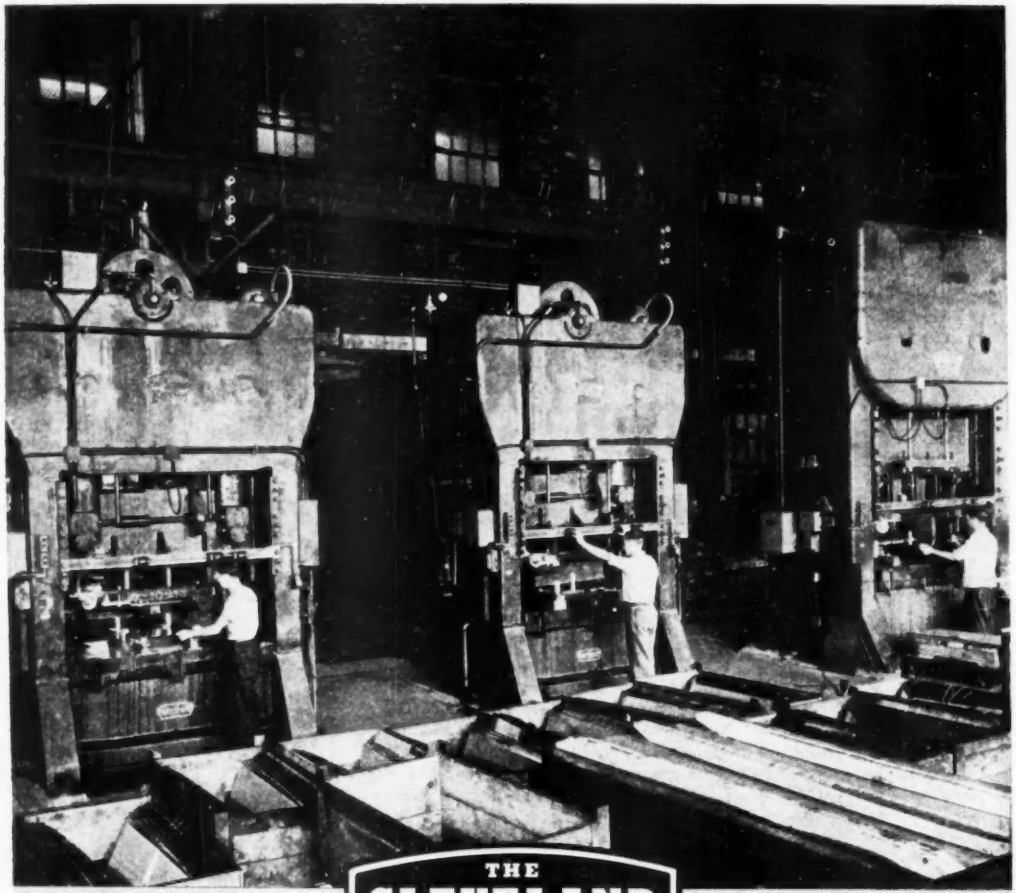

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Defects in Connecting Rod Forgings shown under Black Light

Fast, Accurate Inspection Plus Doubled Savings!

These are the immediate results achieved by one of the major automotive plants using Magnaglo* for inspection of connecting rod forgings. Here's the complete story:

FORMERLY— Connecting rod forgings were cleaned by pickling, then visually inspected. Cost per thousand was $7.50 for cleaning and inspection.

TODAY— Forgings are cleaned by shot blasting, then inspected with Magnaglo under black light, using less man hours with semi-automatic Magnaflux production units. Cost is now $6 per thousand.

Faster inspection at lower cost . . . yes; and still more important is the far greater accuracy of Magnaglo. With visual inspection this plant saved $100 per day in machining time by eliminating defective forgings in the rough state. With Magnaglo, savings are $200 per day because twice as many defective forgings are spotted *before* machining.

Production officials of this plant give full approval to Magnaflux for improved quality control at production line speed that really "pays off". Magnaflux non-destructive inspection can achieve similar savings for you—write today for full particulars.

** Magnaflux, Magnaglo, trademarks of Magnaflux Corporation applied to equipment and materials for use with magnetic particle and fluorescent magnetic particle inspection methods.*

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We Helped a Gear Manufacturer Eliminate 19 Grades of Alloy Steel

Our metallurgists were recently asked by a large Eastern gear manufacturer to review his steel requirements and determine where various alloy grades could be eliminated. After a study of the manufacturer's methods and products, it was found that his list of 25 alloy grades then in use could be cut to 6 without sacrificing or compromising any of the necessary properties of the finished gears.

Like many other firms this one had been using a wide variety of costly grades, some of which were not altogether essential or justified. This may not be the situation in your plant, but we suggest you have your steel needs reviewed periodically so as to hold the grades to the minimum.

Here is how simplification of grades helps you:

1. **You can order alloy steels in larger quantities.**
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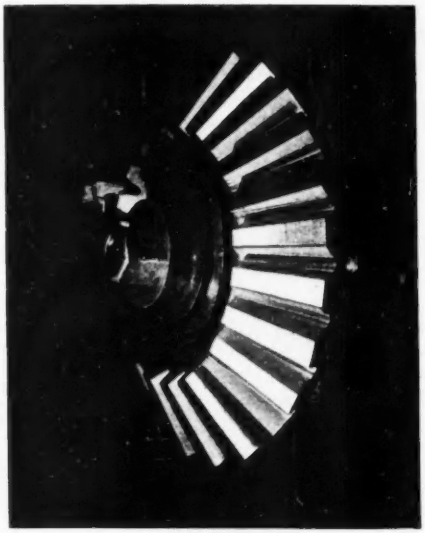
3. **You can usually get better deliveries.**
4. **You can cut down your inventory.**
5. **You reduce the possibilities of error.**

We shall be glad to give you sound metallurgical advice on grade simplification. Or if you have any other problems on specifications, properties and treatments, let us help you with the solution.

We manufacture all the various AISI steels, as well as special grades for every purpose.



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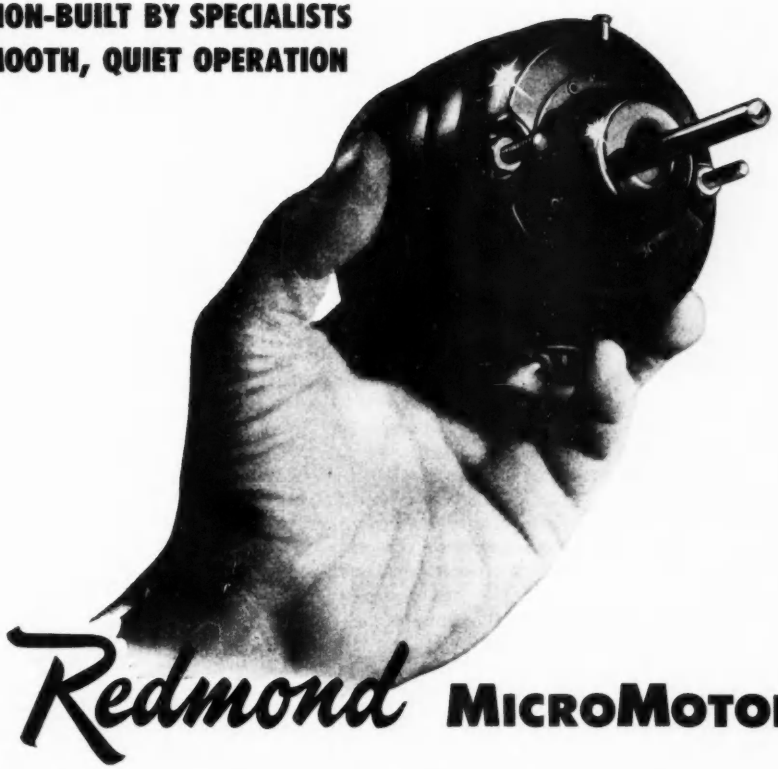

Redmond MicroMotors

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Get your hands on a Redmond Micromotor . . . any model, any type to suit your particular application. You'll like the solid, substantial "feel" of it . . . the apparent fine care with which it was assembled and finished. You'll approve its smart, crisp appearance . . . its sturdy, rugged construction. And, as you check its details point for point against your own low-range power requirements, you'll fully appreciate the many advanced engineering features that have been incorporated in its design. They're precision features developed by Redmond small motor specialists to give you smoother, quieter operation and maximum long-life performance at minimum cost.

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Carboloy announces . . . an improved grade 905

For machining today's high tensile-strength cast iron

TOOL LIFE can be *doubled* when machining high tensile-strength cast iron with Carboloy's improved Grade 905! Equally improved tool life is possible on non-ferrous metals.

This improved carbide is a direct result of Carboloy's continuing policy of improving all grades to meet machining problems brought about by metallurgical developments. It brings production-increasing, money-saving performance to your machining jobs.

Here's proof

Carboloy's improved Grade 905 was used on a job involving the complete machining of 180-230 Brinnel cast-iron clutch pressure plate faces. Procedure was (1) rough facing—⅛" depth, .030" feed and SFPM of 215 to 355; and (2) finish facing—1/32" depth, .020" feed and 320 to 550 SFPM. On this job, competitive grades turned out 97 pieces per grind, *while Carboloy's improved Grade 905 turned out 149 pieces!*

Why not take advantage of the time, labor and money savings improved Grade 905 brings you? Specify it in your next order. Carboloy Company, Inc., 11151 E. 8 Mile Road, Detroit 32, Michigan.

Here's a case history of the amazing performance of Carboloy's improved Grade 905.

CASE X

Job: Precision-boring back bearing holes for crankshaft in cylinder blocks.

Material: Alloy cast iron.

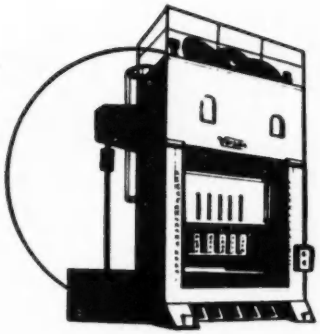
Bearings: 2⅝" diam. bore, 2¾" long.

Depth of cut—.009" to .010"
Feed—.010"
SFPM—438

Competitive grade (Avg.) —1000 pieces per grind.

Improved Grade 905 (Avg.) —2000 pieces per grind.

CARBOLOY®
CEMENTED CARBIDE



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Deferred Payment Plan for the Purchase of New Equipment

In the past twenty-two years we have helped many of our clients purchase Verson Equipment with a minimum initial investment by means of our Deferred Payment Plan. As a result, theirs are modern plants, today.

Our plan is a simple one. It consists of nothing more than a moderate down payment with the balance payable in monthly installments. The interest you pay is simple bank interest. While each manufacturer's financial requirements differ, flexibility is the keynote of our plan so that all can participate.

Many of our clients who have used our plan tell us the installments "were just like paying rent." Be wise—modernize. Let modern Verson equipment pay for itself.

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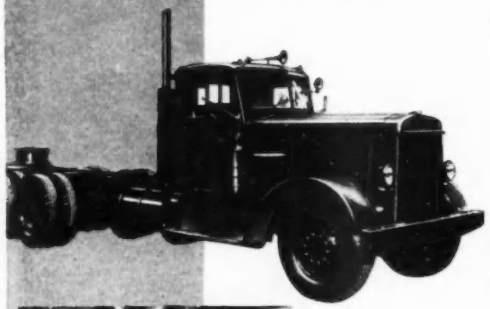
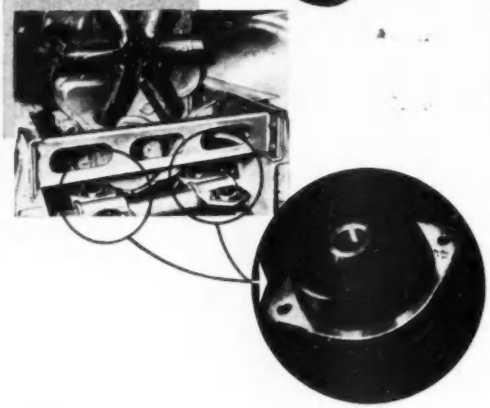
RADIATOR PROTECTION

with a LORD vibration control system





RADIATOR protection is built into Peterbilt Trucks by the use of a Lord Vibration Control System. Expensive radiators are given longer life . . . maintenance cost is reduced. Lord Mountings isolate destructive high-frequency vibration and damp out the hard knocks of road shock and off-road operation.

This dependable protection can be engineered into your product whether it be a truck, bus, railroad car, or locomotive, to give longer and better service and enhance the sales value of your product.

LORD MANUFACTURING COMPANY · ERIE, PA.
Canadian Representative: Railway & Power Engineering Corp. Ltd.

LORD Vibration Control Systems

When designing Direction Signals

Specify:

TUNG-SOL FLASHERS

You can take the dependability, uniform performance characteristics and long life of TUNG-SOL Flashers for granted. These Flashers have proved themselves ever since flashing direction signals were successfully used on cars. They are instant starting and are not affected by ambient temperatures. Because TUNG-SOL Flashers permit safety pilot indication, they are admirably adapted for use in hand brake indicators as well as in direction signals.

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HE'LL BE THROUGH FOR KEEPS

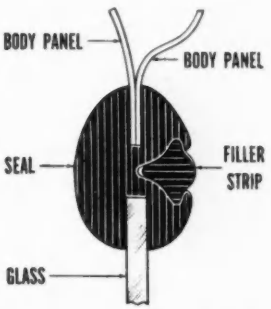
For fast, permanent weatherproofing on any vehicle, choose Inland Self-Sealing Weather Strip

Look at him! One last, swift, zipper-like motion . . . and the job will be done . . . the vehicle permanently weatherproofed!

That's why Inland Self-Sealing Weather Strip slashes production cost for the maker of trucks, buses, cabs, passenger cars, *any* vehicle! And slashes maintenance costs for the user of the vehicle!

The old high-cost method demanded two men, preparation, subassembly, slow installation, cementing, reworking and clean-up. But *only one man* does it, the Inland way . . . a simple, easy job, in much less time, at much lower cost.

Vehicle operators want Inland Self-Sealing Weather Strip as original equipment. They want permanent leakproofing in any weather . . . faster, cheaper glass replacements . . . less time lost in vehicle operation . . . and bigger profits.



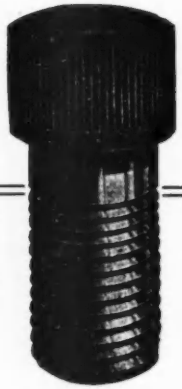
See how easy it is? The seal goes readily onto the body panel or adjacent glass. Then the glass fits into the seal. Then the filler strip is zipped into the locking channel. That window or windshield is weatherproofed *for keeps*. Simple, easy, fast, economical!

INLAND MANUFACTURING DIVISION
GENERAL MOTORS CORPORATION • DAYTON, OHIO

INLAND MANUFACTURING

Self-Sealing Weather Strip
(PATENTED)

THE Knurled HEAD . . .



. . . PERFORMS TRIPLE DUTY!

UNBRAKO *KNURLED*

SOCKET HEAD CAP SCREW

There is a definite saving of assembly time when you use "UNBRAKO" Socket Head Cap Screws with *Knurled* Heads. The exclusive knurled heads perform *triple* duty: (1) the *knurling* provides a sure, slip-proof grip; (2) the *knurling* permits positive locking—a feature so often essential where there is excessive impact or vibration; (3) the *knurling* speeds assembly, because it enables the "UNBRAKO" to be screwed in faster and further with the fingers — handiest of all wrenches — before a "key" becomes necessary.

As always, the brand name "UNBRAKO" signifies *extra strength* and *precision manufacture to close tolerances.*

"UNBRAKO" *Knurled* Socket Head Cap Screws are available in both National Coarse and National Fine Thread Series, in a full range of standard sizes. Other sizes to special order. Write us for your free copy of the "UNBRAKO" Catalog and the name of your nearest "UNBRAKO" Distributor.

Other "UNBRAKO" Products include:
Self-Locking Socket Set Screws with Knurled Cup Points, Self-Locking Socket Set Screws with Knurled Threads, Self-Locking Square Head Set Screws with Knurled Cup Points (all "Self-Lockers" that won't shake loose). Knurled Socket Head Stripper Bolts. *Precision-Ground* Dowel Pins. *Fully-Formed* Pressure Plugs.

Knurling of Socket Screws originated with "Unbrako" in 1934.

SPS STANDARD PRESSED STEEL CO.
BOX 671, JENKINTOWN, PENNSYLVANIA
"Serving Industry continuously since 1903 through Industrial Distributors"

IF

Direct Mail is the most selective form of advertising—**IF.**

Direct Mail is one of the most economical forms of advertising—**IF.**

Direct Mail may be the most precise form of advertising—**IF.**

And the degree of **"IF"** depends upon the quality and dependability of the list you use.

That fact is the main reason why CHILTON AUTOMOTIVE LISTS are the mailing lists for practically the entire automotive industry.

They are corrected daily, for the highest attainable degree of accuracy.

They are cross-checked for the elimination of all discernible duplication.

They are maintained by our trained force of list compilers, most of whom do nothing else during each working day; many of whom have been doing it without interruption since the inception of these lists 30 years ago.

Mailings made over CHILTON LISTS may be made with full assurance that statements concerning the accuracy and dependability of the names provided need no qualifying **"IF."**

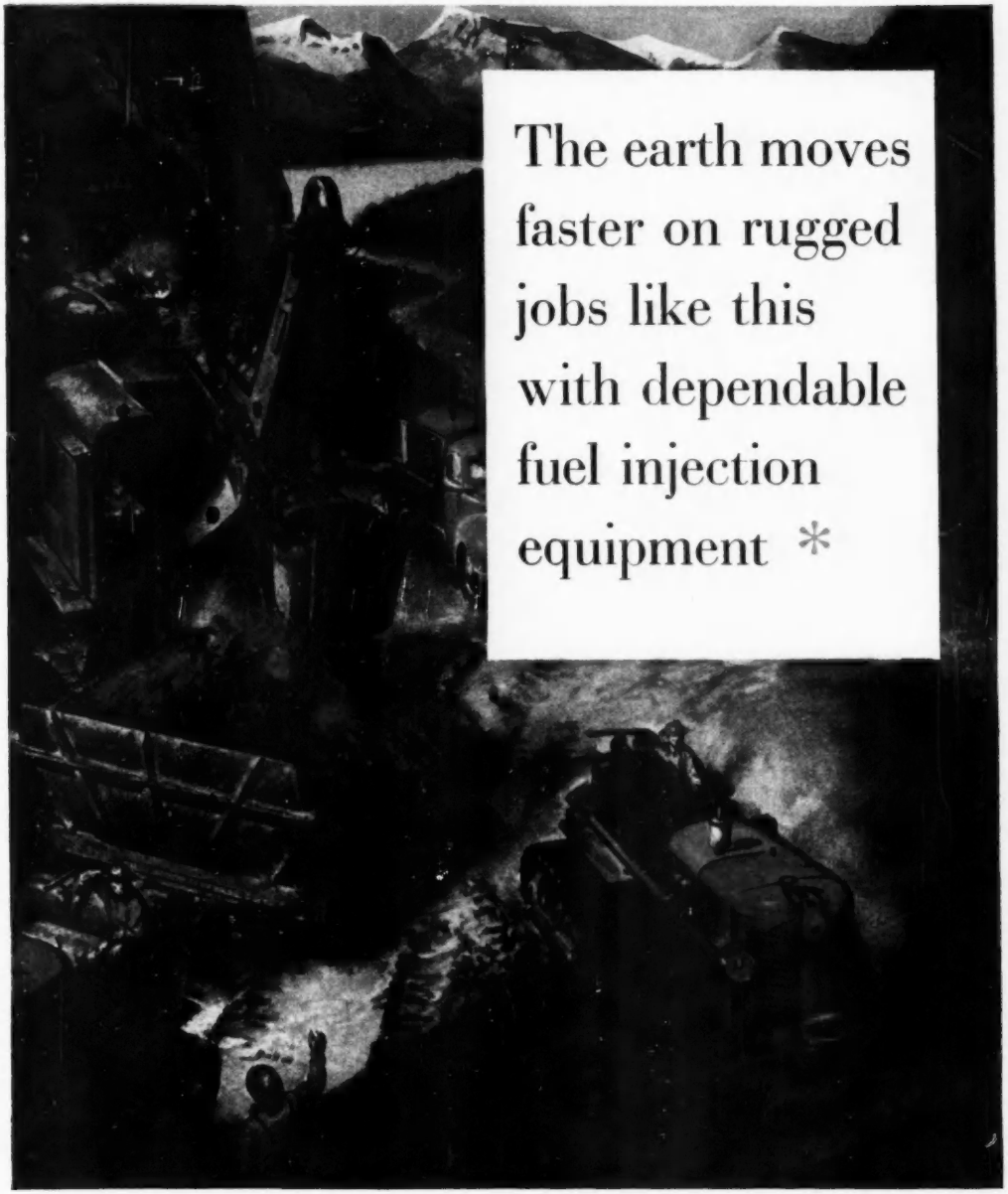
For selectivity, economy and accuracy CHILTON AUTOMOTIVE LISTS excel.

Write for free data file.

Direct Mail Division

CHILTON COMPANY

Chestnut and 56th Sts. (1) *Philadelphia 39, Pa.*



The earth moves faster on rugged jobs like this with dependable fuel injection equipment *

made by

American Bosch

Wherever Diesels take the incredible punishment of heavy earth-moving and excavating operations — you're almost sure to find American Bosch fuel injection equipment performing its exacting work. For years, American Bosch has been outstanding in this field. Construction men know from experience they can rely on American Bosch equipment for real performance and dependability. Diesel engine builders know they can count on American Bosch for competent engineering and precision production.

American Bosch Corporation, Springfield 7, Mass. • Service the World Over

SPINNING POWER

GLOBE-UNION

Globe-Union Batteries Start the World's Motors

GLOBE-UNION INC.
MILWAUKEE 1, WIS.

Atlanta • Dallas • Cincinnati • Los Angeles
Medford, Mass. • Oregon City, Ore. • Memphis
Emporia, Kan. • Philadelphia • Mineral Ridge, O.

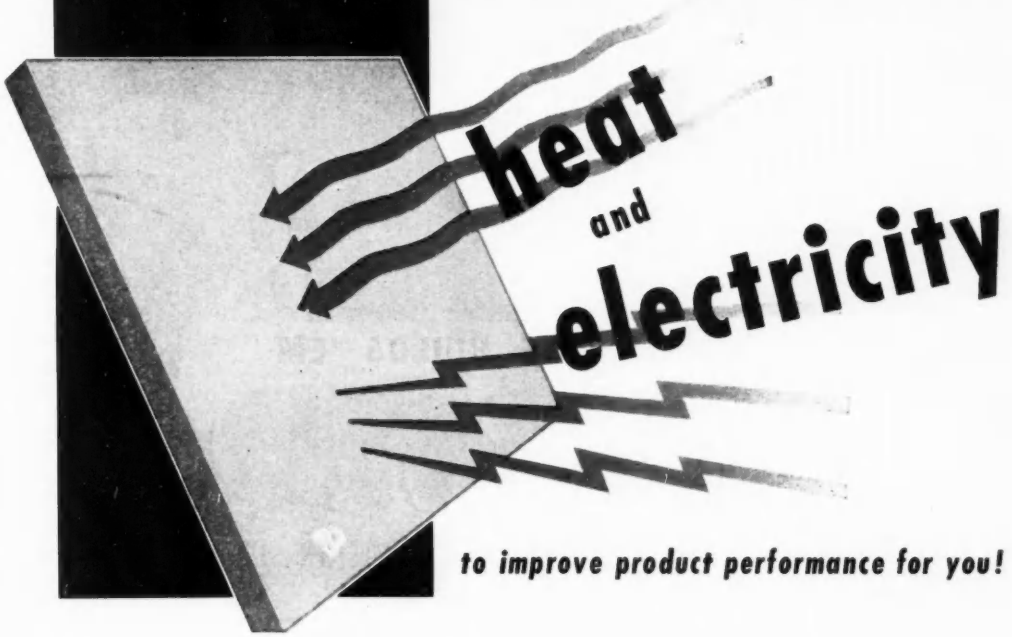
Full-Spark

"THE POWER PLUG"

Finer Performance Four Ways:

1. Quicker starting
2. Faster pickup
3. Full power from every ounce of fuel.
4. Heatrol insulator assures better motor operation.

NEW C-D Silicone Dilecto withstands an inferno of



to improve product performance for you!

There are three new grades of C-D Dilecto* that can withstand temperatures as high as 250°C. They are chemically inert, silicone-glass laminated plastics that offer exceptionally high heat resistance and good arc resistance, extra strength, and positive moisture resistance! At Continental-Diamond we've literally lived and worked with Silicone Dilecto—perfecting it to a point where we believe it can be highly useful in helping to solve your production problems — and improve product performance.

And this remarkable plastic is but one of many in the C-D family. They provide practical combinations of mechanical, electrical, and chemical properties—structural strength, light weight, positive moisture, heat and corrosion resistance. In hundreds of plants, C-D Plastics—Fibre, Vulcoid, Dilecto, Celoron, and Micabond—offer proof that it pays to see C-D first in your search for the right plastic for the job. For interesting, useful information on Silicone Dilecto, and other C-D high strength plastics, call or write your nearest C-D office, soon.

your partner in producing better products

*Dilecto GB—112—S
Dilecto GB—128—S
Dilecto GB—261—S

DE-2-49

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WEST COAST REPRESENTATIVE: MARWOOD LTD., SAN FRANCISCO 3 • IN CANADA: DIAMOND STATE FIBRE CO. OF CANADA, LTD., TORONTO 8

Continental-Diamond FIBRE COMPANY

Established 1895..Manufacturers of Laminated Plastics since 1911—NEWARK 2 • DELAWARE

KENT-OWENS BUILDS 'EM

RUGGED

TO KEEP YOUR PRODUCTION UP AND COSTS DOWN!

Maybe we're "sticking our neck out"—but we think your toughest milling problems can be handled *right* with Kent-Owens Machines!

On countless jobs—these Milling Machines have shown ability to turn out the work with top speed and high accuracy. They're outstandingly rugged . . . efficient . . . dependable. Designed with practical features that help you *produce more* . . . with *lower costs!* The Kent-Owens Standard line includes a wide range of hydraulic and hand operated machines. Let Kent-Owens engineers recommend machines and tooling best suited to your requirements. Write us about your needs. Kent-Owens Machine Company, Toledo, Ohio.

KENT-OWENS *Milling Machines*

KENT-OWENS REPRESENTATIVES

BOSTON
General Machinery Corp.

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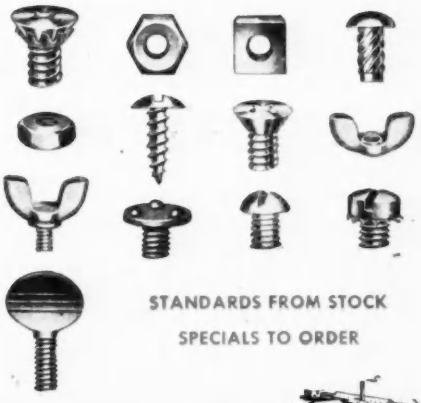
Snap that toggle switch. On go the lights. And several Central binder head screws are always there, protecting your lighting circuit. Pick up your phone and Central stainless fillister screws are on duty in the switchboard that routes your messages the Central way—efficiently. Yes, Central fasteners are specified for better and faster assembly of these and all other types of electrical products.



Fast DELIVERIES...
FROM CENTRAL'S **2** BIG PLANTS

STANDARDS FROM STOCK
SPECIALS TO ORDER

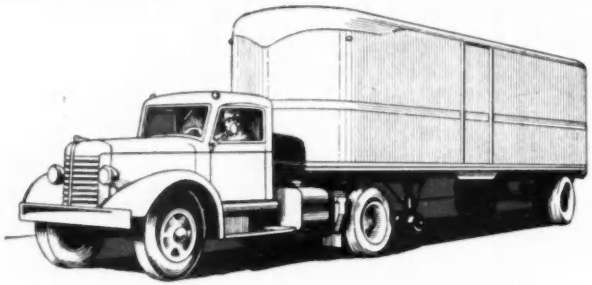
A TWO-PLANT ORGANIZATION FOR QUICK NATION-WIDE SERVICE

"You Can Depend on Central"

CENTRAL SCREW COMPANY

3501 SHIELDS AVE., CHICAGO 9, ILL. • 149 EMERALD STREET, KEENE, N. H.

Increase Your Truck's Carrying Capacity



Why make *your* trucks haul unnecessary, non-profit-earning DEADWEIGHT that reduces the PAYLOAD part of their legal gross poundage? MECHANICS Roller Bearing UNIVERSAL JOINTS Truck PROPELLER SHAFTS are made 34% lighter, run smoother and place much less load on transmission and pinion bearings — without loss of torque. Let our engineers help add to the ton-mile capacity of *your* trucks by specifying weight-saving MECHANICS Roller Bearing UNIVERSAL JOINTS Truck PROPELLER SHAFT applications.

MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2024 Harrison Avenue, Rockford, Illinois

With 34% Lighter

MECHANICS

Roller Bearing BW

UNIVERSAL JOINTS

For Trucks • Busses • Industrial Equipment

NATIONAL OIL SEAL LOGBOOK

OIL SEALING UNDER SEVERE MISALIGNMENTS

In some heavy stationary machines, such as found in paper mills and similar industries, where cycle of operation is changed frequently, special consideration must be given to bearing protection. In order to employ friction-free bearings it is necessary to provide oil seals which insure lubricant retention under extreme eccentricities and misalignments.

SYNTECH*
(synthetic rubber)
...sealing members are ideal for use on eccentric mechanisms because of their inherent flexibility.

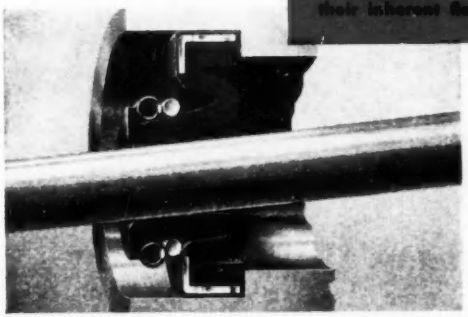


Figure 1
How Convoluted Flex-type seal with extended lip follows misaligned shaft.

Figure 2
Compact design of Convoluted Flex-type seal.

LONG, FLEXIBLE SEALING LIP

A National Syntech Oil Seal, having an extra long, flexible sealing lip, is currently being employed in mechanisms of this kind. This special seal, similar to the Convoluted Flex-type (Fig. 1), permits a shaft movement off center as much as .060" while under continuous operation, or much greater under static conditions, without loss of lubricant from the bearing. This particular seal employs two tensioning springs on the sealing lip. One is a conventional coil spring while the other is a single-ring type spring, designed to relieve strain from the coil.

SPECIAL SEALS FOR EXTREME PROBLEMS

National engineers have been able to solve many difficult sealing problems through the use of Syntech sealing members. In the Special Convoluted Flex-type seal (Fig. 2), the same design principle is employed in a more compact manner for limited space applications. In many cases oil seals, whether of special design or taken from National's broad group of stock numbers, have been found more efficient and more economical than complicated packing systems formerly utilized. Further information will be gladly provided. Please contact the nearest National Oil Seal office.

NATIONAL
OIL AND FLUID SEALS

NATIONAL MOTOR BEARING CO., INC.
General Offices: Redwood City, Calif.
Plants: Redwood City and Los Angeles, Calif.; Van Wert, Ohio

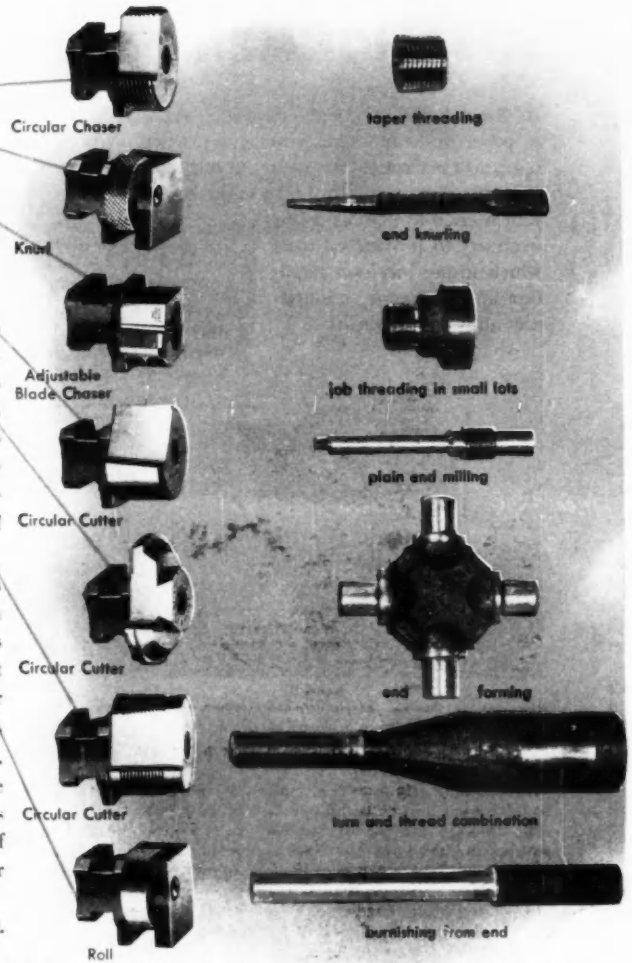
**Syntech is the registered trademark for the National synthetic rubber compound.*

1951

CALL IN A NATIONAL ENGINEER FOR RECOMMENDATIONS

BUFFALO: 56 Arlington Place, Grant 2280.
CHICAGO: Room 2014 Field Building, Central 6-8663.
CLEVELAND: 210 Heights Rockefeller Bldg., Yellowstone 2720.
DALLAS: 30½ Highland Park Village, Justin 8-8453.
DETROIT: Room 1026 Fisher Building, Trinity 1-6363.
HOUSTON: 6731 Harrisburg Boulevard, Wayside 3-1246.
LOS ANGELES: 2244 East 37th Street, Kimball 6384.
MILWAUKEE: 647 West Virginia St., Marquette 8-8986.
NEW YORK CITY: 122 East 42nd Street, Lexington 2-8260.
PHILADELPHIA: 401 North Broad Street, Bell-Walnut 2-6997.
REDWOOD CITY, CALIF.: Broadway and National, Emerson 6-3861.
WEST SPRINGFIELD, MASS.: 1025 Elm Street, Springfield 2-1881.
EAST SYRACUSE, N. Y.: 226 Roby Avenue, East Syracuse 366.
WICHITA: 340 North St. Francis Ave., Wichita 2-6971

You name the job...VERS-O-TOOL has the cost-cutting answer



Whenever you need accurate, *economical* threading or forming cuts, there's no faster way than to use Nanuco chasers or hollow milling cutters, interchangeable, size for size, on *the same* Vers-O-Tool head. Regardless of your lot size, there's a chaser or cutter exactly suited to your needs—*and your production budget.*

An important part in the savings you'll make on such jobs stems from this versatility of Vers-O-Tools. Less money is tied up in tool inventory. But there are other savings, too: longer tool life, faster production, fewer rejects.

And Vers-O-Tools are space savers. You can use them on many jobs where other die-heads won't fit in. What's more, quick diametric adjustment of the cutters permits set-up in a matter of seconds.

Like more facts? Ask for Catalog D 49.

24-HOUR DELIVERIES ON STANDARD STOCKABLE NF AND NC CHASERS WITH BLOCKS

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics • Single Spindle Automatics • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

PERCENTAGES BY WHICH PUROLATOR MICRONIC ELEMENT EXCELLED COMPETITIVE TYPES

COMPETITOR	IN AVERAGE DIRT RETENTION PUROLATOR LED BY:
A	199%
B	220%
C	113%
D	547%
E	164%
F	619%
G	255%
H	339%
I	318%
J	193%
K	237%
AVERAGE PUROLATOR SUPERIORITY	290%

Water dilution can't warp, distort, or disintegrate this oil filter!

HERE'S PROOF, TOO, THAT PUROLATOR'S MICRONIC ELEMENT REMOVES 290% MORE ABRASIVES!

Put a Purolator Micronic Oil Filter element in a jar of water . . . let it stand for as long as 100 hours . . . *it will not warp, distort, or disintegrate!*

That's an extremely important Purolator advantage, since the oil in your average crankcase is frequently diluted with as much as 5% water. And as little as 2% water dilution causes many ordinary elements to swell up and practically shut off the oil flow through the filter within a few short hours.

But here's the *real* pay-off! Purolator removes an average of 290% more abrasives because it filters particles measured in microns (.000039 of an inch) . . . has a filtering surface 5 times that of old-style filters . . . does not permit channeling or unloading.

Car owners everywhere are reading about Purolator via the most aggressive coast-to-coast advertising campaign in the oil filter industry. That's why you'll get greater acceptance for vehicles and engines carrying Purolator Oil Filters as original equipment. For details—and specialized help with your particular filtering problem—contact us direct.

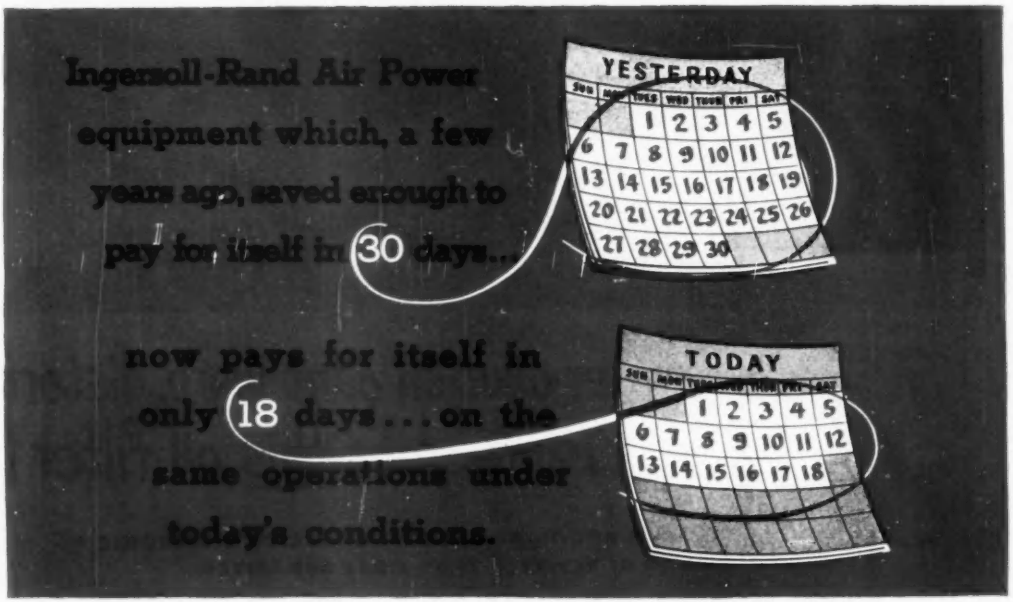
PUROLATOR PRODUCTS INC.
Newark 2, New Jersey
and Windsor, Ontario, Canada

PUROLATOR
MICRONIC OIL FILTER
"FIRST IN THE FIELD OF FILTERING"

AIR POWER

PAYS FOR ITSELF nearly TWICE as fast now

Time and cost studies prove this...



To find out exactly what this fast pay-off time on Air Power equipment means to you, ask your Ingersoll-Rand engineer to make a job study in your plant. He will help you make actual Air Tool performance tests right on your own operations... then help you determine how much money you can save, and how quickly Air Power equipment will pay for itself.

AIR POWER
The Key to Lower Production Costs

Ingersoll-Rand

11 Broadway, New York 4, N. Y.

SAGINAW

for Quality and Quantity

IN STEERING GEARS

Whatever your steering requirements, no matter how exacting—for passenger cars or busses, trucks or farm tractors—you can depend on Saginaw Steering Gear Division to meet your needs. And whatever type of steering you choose, you can obtain it in the right ratio and the right capacity to suit the vehicle and its load.

Saginaw's long record of successful specialization in steering gear engineering and manufacturing is your assurance of quality . . . and Saginaw's greater production capacity is your assurance of quantity, an unfailing supply to meet your production schedules.

There's a Saginaw Steering Gear That Exactly Suits Your Needs

Saginaw, long a leader in improving conventional steering gears and in developing new and advanced types, offers a complete range of ratios and capacities, in the type that best suits your needs.

- *Hydraulic Power*
- *Roller Tooth*
- *Recirculating Ball*
- *Worm and Sector*

GM PRODUCTS

Saginaw

STEERING GEAR ASSEMBLIES • STEERING LINKAGE ASSEMBLIES
PROPELLER SHAFTS • DIESEL ENGINE AND AIRCRAFT PARTS

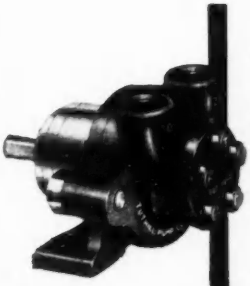
Classified Advertisements

DOUBLESEAL your overhead door. DOUBLESEAL closes gaps under overhead doors, stops drafts. Edwards Industries, Dept. 81, 4268 Shenandoah Ave., St. Louis 10, Mo.

Internal Combustion Engine Development: More horsepower from small displacement. Good economy, smooth operation, compact. Higher compression with curb gas. Engine available for demonstration. 15 patent grants and applications. Aged inventor desires outright sale. Box 74, Automotive Industries, 5601 Chestnut St., Philadelphia 39, Pa.

Lines Wanted—On distributor or manufacturers representative basis for Kansas or could include Colorado. 20 years' sales experience, own building in center of Kansas, town served by three railroads, also truck lines so am in position to warehouse if wanted, working one salesman now, can secure another experienced man if needed. Reply Box 73, Automotive Industries.

BUY BONDS



THIS SMALL PUMP CAN DO BIG THINGS FOR YOU

IN PRESSURE LUBRICATION

ON HYDRAULIC MECHANISMS

FOR FUEL OR LIQUID TRANSFER

It's the Tuthill Model L . . . a positive displacement, internal-gear rotary pump with the famous Tuthill mechanical seal. Capacities up to 3 g.p.m. at pressures to 400 p.s.i. Ring or foot mounting. Many porting arrangements. Write for Model L bulletin.

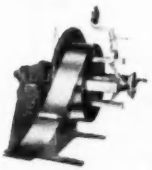
TUTHILL PUMP COMPANY

939 East 95th Street, Chicago 19, Ill. Phone: Regent 4-7420

It pays to do business in New York State!

There are far more industrial workers in New York State than in any other. Yet the ratio of time lost through strikes to total time available in this state last year was *half* the national average! For more information, write: N. Y. State Dept. of Commerce, Room 343, 112 State St., Albany 7, N. Y.

If you operate a Press Room study these Littell REELS



HERE'S the way to speed up blanking, cupping, etc. Littell Reels enable you to use time-saving, money-saving coil stock in place of sheet stock. No more lost motion for continual insertion of new sheets. Less scrap, too. One operator using Littell Reels can tend several presses.

Littell Reels are self-centering. The heavy coil is always balanced for smooth, effortless feeding. They never over-run. Heads on No. 10 Reel and smaller are adjustable to any angle. Quick loading.

The Reels pictured are only three among dozens of Littell models. Write today for full details on Littell Reels, Feeds, Air-Blast Valves, Scrap Winders, etc. ***REQUEST BULLETINS***

Top — No. 3 Reel, 300 lbs. capacity. *Center*—No. 25 Reel, 2500 lbs. capacity. *Bottom*—No. 60 Reel, 6000 lbs. capacity.

F. J. LITTELL MACHINE CO.

4155 RAVENSWOOD AVE., CHICAGO 13, ILL.

FOR BUS, TRUCK, AND TRACTOR APPLICATIONS

GENERAL CONTROLS

hi-g* VALVES

PV-1

Normally closed shut-off valve of the electro-magnetic type—various magnet sizes—full ported or restricted ports—for all types of fluid, gasoline, air, water, oils, etc.

PV-9

Pilot Piston valve for medium and high pressure applications. Normally open and normally closed types. Controls hydraulic oils, fuels, lubricating oils, water, etc. 50 to 3000 P.S.I. operating pressure.

PV-16

Electric motor valve, suitable for fuel, hydraulic fluid and lubricating oil shut-off. High flows at low pressure drop, explosion-proof motor and switch cover.

PV-11

Three-way Electro-Magnetic valve used for distribution of fluid flow or for "feed in" and "exhausting" fluid from a cylinder, piston or vessel.

PV-7

Four-way selector type control-operating pressure up to 3000 P.S.I. for control of fluid pressure operated cylinders.

PV-2

Same as PV-1 except is normally open type. For control of various fluids, oil, water, gasoline, air, etc.

GENERAL CONTROLS

Manufacturers of Automatic Pressure, Temperature and Flow Controls.

FACTORY BRANCHES: Birmingham (3), Boston (16), Chicago (5), Cincinnati (2), Cleveland (15), Dallas (2), Denver (10), Detroit (8), Glendale (1), Houston (6), Kansas City (2), New York (17), Philadelphia (40), Pittsburgh (22), Seattle (1), San Francisco (7), St. Louis (12), Tulsa (6). **DISTRIBUTORS IN PRINCIPAL CITIES.**

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Advertisers

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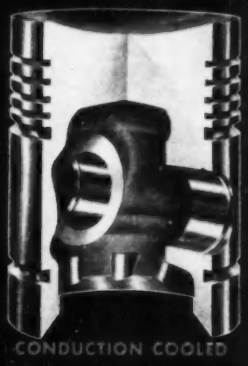
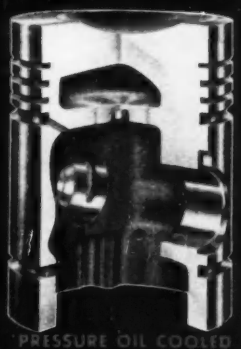


CONDUCTION COOLED



PRESSURE OIL COOLED

SERRATED FINISH

COMPLETE
ENGINEERING COOPERATION

TAILOR-MADE PISTONS FOR YOUR DIESEL ENGINE

Original Equipment in America's Finest Motors

WAUKESHA	MARMON-HERRINGTON
HERCULES ENGINES	GMC
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ZOLLNER

PISTON EQUIPMENT *for* INTERNAL COMBUSTION ENGINES —BOTH GASOLINE AND DIESEL

ZOLLNER MACHINE WORKS
FORT WAYNE, INDIANA

Unmatched

FOR UNIFORMITY, QUALITY, AND STAYING POWER

Everlock Screw-Washer Assemblies are engineered and manufactured to insure that unvarying uniformity so vital to quick, low-cost assembly . . . and dependable performance under all conditions. Precision is the **Everlock** watchword through selection and inspection of steel, control of dies, heat treating and final inspection.

There is a precision-built **Everlock** Screw-Washer Assembly for every need. All types provide the unmatched staying power of non-removable **Everlock** Lock Washers' wide chisel edges. Other important advantages include simplified ordering and stocking, automatic assurance that lock washers are applied where needed for positive resistance to every hazard of vibration, expansion, contraction and strain.

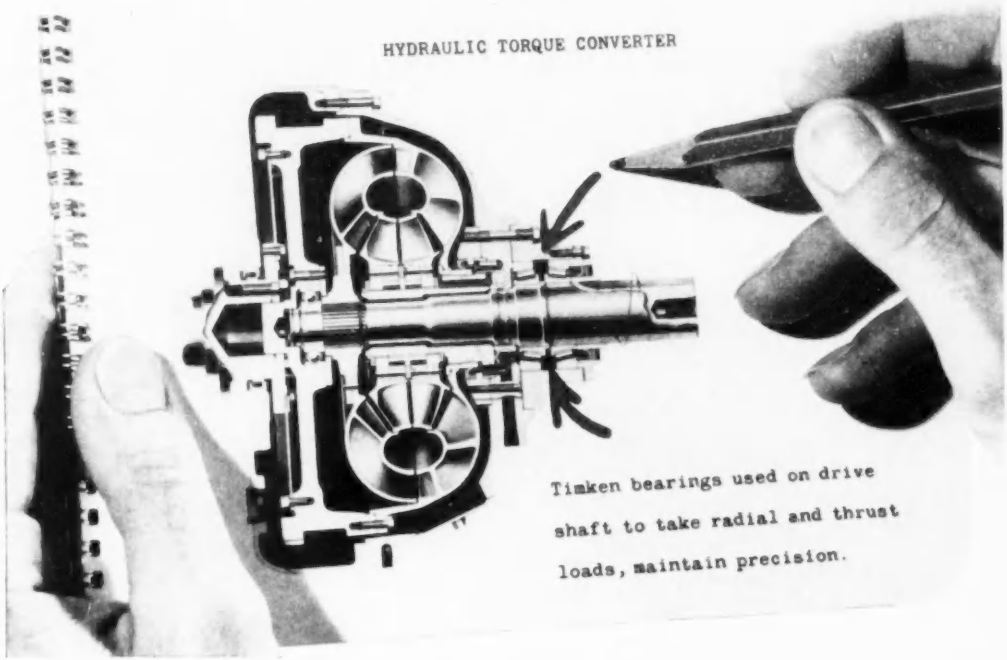
WRITE FOR PARTICULARS

THOMPSON-BREMER & COMPANY, 1642 W. HUBBARD ST., CHICAGO 22, ILL.

THERE'S AN
Everlock
LOCK WASHER
FOR EVERY NEED

the washer that has the edge

Standard External Everlock | Standard Internal Everlock | Standard 82° Countersunk Everlock | Standard Internal External Everlock



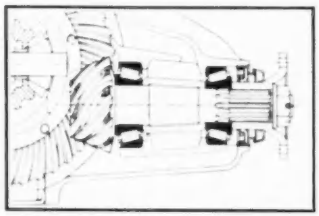
Does this new torque converter hold an idea for your secret transmission?

TAKE a quick look at the drive shaft on the new hydraulic torque converter shown above. It's mounted on Timken® bearings—an idea worth giving some thought to for *your* new transmission design.

You want smooth, quiet operation and long life. Timken tapered roller bearings hold shafts rigidly in line, prevent deflection and end-movement. Where gears are used, Timken bearings provide smoother meshing. They reduce friction to a minimum and reduce wear on adjacent parts.

You want a simple design. Higher load capacity of Timken bearings—thanks to line contact between rolls and races—lets you use smaller bearings, save space. No separate thrust bearings or washers needed because Timken bearings' tapered construction takes both radial and thrust loads in any combination.

You want economy. Besides the savings mentioned, Timken bearings



All but two cars use Timken bearings on the pinion. Here's a typical application.

permit wider tolerances of surrounding parts. They can be precisely and permanently adjusted at installation.

There's plenty of evidence of these advantages right in your own "backyard". Timken bearings are used for the automotive industry's toughest bearing job—pinions—on all but two makes of passenger cars. What's more, they've been doing a variety of other tough automotive jobs for 50 years.

For qualified help with your bearing design problems, make use of our engineering staff. In Detroit, phone TRinity 5-1580. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

NOTE TO P. A.'S. *Because every step of the manufacture of Timken bearings is controlled within our company... because our vast manufacturing facilities are widely dispersed... you will find The Timken Roller Bearing Company a supply source of outstanding reliability.*

TIMKEN

TAPERED ROLLER BEARINGS

TIMKEN 1899 50 1949

50th birthday of the company whose products you know by the trade-mark: TIMKEN

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ◫ LOADS OR ANY COMBINATION